

kilobaud

November 1981 USA \$2.95

# MICROCOMPUTING<sup>T.M.</sup>

A WAYNE GREEN PUBLICATION

## R<sub>x</sub> for Medicine

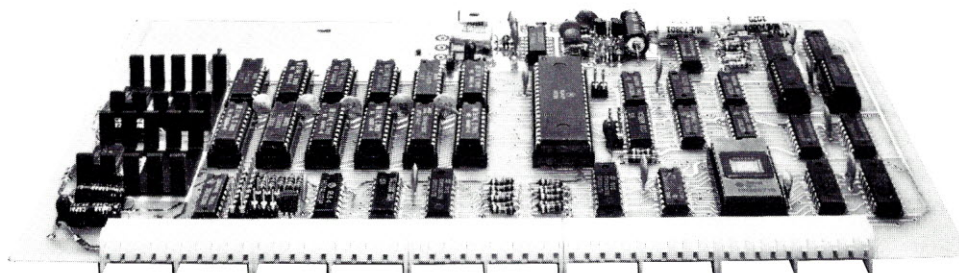
Will Micros Change  
The Way Your Doctor Operates?





**Now! Color for Your...**

# SYSTEM-50



## Introducing COLORAMA-50™ Percom's SS-50 Bus Color VDG

Introductory  
Price  
**\$219.95**

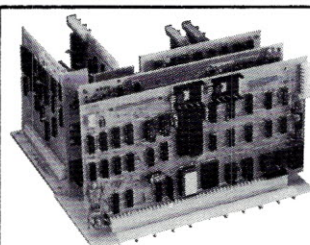
### Featuring...

- **Eleven display formats** including 8-color semigraphics, 4-color graphics, 2-color high density graphics and 2-color alphanumerics.

Moreover, two- and four-color displays may be switched between primary and complementary color sets under software control or from the keyboard.

Full graphic resolutions range from 64 x 64 picture elements to 256 x 192 picture elements.

- **Instant display control:** The COLORAMA-50™ is memory mapped: your MPU has direct, instant access to display RAM and display control registers.
- **Low-cost Modulator Option for Color TV Interface:** The COLORAMA-50™ provides for installation of an inexpensive RF modulator such as Radio Shack PN 277-122 for operation using a color TV.



### SS-50 Bus Department Store

Nobody supports the  
SS-50 bus like Percom:

- ✓ SS-50 Bus/Single-Board Computers with I/O ports & memory
- ✓ Static and Dynamic RAM cards — memory expansion kits
- ✓ LFD-400/800 1-, 2- and 3-drive mini-disk systems
- ✓ Color and monochrome memory-mapped display controllers
- ✓ Extendable 7-slot SS-50 bus motherboards
- ✓ Versatile prototyping boards: SS-50 and SS-30 bus
- ✓ Field-proven software: monitors, operating systems, drivers, editors, assemblers, debuggers and HLLs.

- **Mix in Sound:** With the optional modulator installed, you can complement your colorful displays with software-controlled audio.
- **Extended Addressing:** The COLORAMA-50™ is compatible with the SS-50A bus and the extended-address SS-50C bus. Map the board into any of the sixteen 64-Kbyte banks of the 1-Mbyte SS-50C address space. The COLORAMA-50™ card "defaults" to the first (lowest) bank for the SS-50A bus.
- **Cassette I/O Option:** Add a few inexpensive components to the on-card circuitry provided and use an audio cassette for program/data storage.
- **Provision for On-Card Firmware:** Put your display operating system, cassette control program, etc. right on the COLORAMA-50™ card in a 2516 (5-volt 2716) EPROM. Resides in the top 2-Kbyte of the card memory space.
- **Operating Software:** Included in the comprehensive users manual is a listing of a display operating system and cassette controller that may be implemented as a callable subroutine function from BASIC or existing operating systems. The programs are optionally available in a plug-in ROM for just \$69.95.

### System Requirements

The COLORAMA-50™ is pin- and outline-compatible with the Percom System-50™ bus, the SS-50A (SS-50) bus and the SS-50C bus. The composite video-sync signal output will directly drive a color (or BW) video monitor. The output may be modulated for operation with a standard (NTSC) TV set. A modulator is not included. The COLORAMA-50™ card occupies 8-Kbytes of memory in the upper half of a 64-Kbyte memory space. Included on-card is 1-Kbyte of display RAM which will accommodate alphanumeric displays, semigraphic displays and two low-density full-graphic displays. For the higher density graphic displays, additional display RAM is required. The optional RAM ICs may be installed on the card.

For quality Percom SS-50 bus products, see your nearby authorized Percom dealer. To order direct, call **toll-free, 1-800-527-1222**. Prices and specifications subject to change without notice. Prices do not include shipping and handling.

PERCOM DATA COMPANY, INC.  
11220 PAGEMILL RD. DALLAS, TX 75243  
(214) 340-7081





Most small system users think all microcomputers are created equal. And they're right. If you want performance, convenience, styling, high technology and reliability (and who doesn't?) your micro usually has a price tag that looks more like a mini. It seems big performance always means big bucks. But not so with the SuperBrain!

Standard SuperBrain features include: twin double-density 5 $\frac{1}{4}$ " drives which boast nearly 350,000 bytes of disk storage — expandable to 10 megabytes. A full 64K of dynamic RAM. A CP/M\* Disk Operating System to insure compatibility to literally hundreds of application packages presently available. And, a 12" non-glare, 24 line by 80 column screen.

You'll also get a full ASCII keyboard with an 18 key numeric pad and individual cursor control keys. Twin RS232C serial ports for fast and easy connection to a modem or printer. Dual Z80 processors which operate at 4 MHz to insure lightning-fast program execution. And the list goes on! Feature after feature after feature.

Better yet, the SuperBrain boasts modular design to make servicing a snap. A common screwdriver is about the only service tool you'll ever need. And with the money you'll save on purchasing and maintaining the SuperBrain, you could almost buy another one. For under \$3,500, it is truly one of the most remarkable microcomputers available anywhere.

Whether your application is small business, scientific, educational or just word processing, the SuperBrain is certainly an exciting solution to the small computer problem. And since you can easily expand it, you'll probably never outgrow it.

Call or write us today for a complimentary copy of our "SuperBrain Buyer's Guide." We'll show you how you can get big system performance without having to spend big bucks.

 **INTERTEC  
DATA  
SYSTEMS®**

2300 Broad River Rd. Columbia, SC 29210  
(803) 798-9100 TWX: 810-666-2115

\*Registered trademark of Digital Research, Inc.

# SUPERBRAIN™





# MICROCOMPUTING

**PUBLISHER/EDITOR**  
Wayne Green  
**EXECUTIVE VICE PRESIDENT**  
Sherry Smythe

**EDITORIAL MANAGER**  
Jeff DeTray

**PUBLICATIONS MANAGER**  
Edward Ferman

**MANAGING EDITOR**  
Dennis Brisson

**ASSISTANT MANAGING EDITOR**  
Susan Gross

**COPY EDITOR**  
Eric Maloney

**TECHNICAL EDITORS**  
Harold Nelson  
G. Michael Vose

**EDITORIAL ASSISTANTS**  
Lise Markus, Linda Stephenson

**ADMINISTRATIVE ASSISTANTS**  
Pat Graham, Nancy Noyd

**ASSOCIATE EDITORS**  
Robert Baker, Ken Barbier, Frank Derfler, Jr., Rod Hallen, Peter Stark, Sherm Wantz

**PRODUCTION MANAGER/PUBLICATIONS**  
Nancy Salmon

**ASSISTANT PRODUCTION MANAGER**  
Michael Murphy

**ADVERTISING GRAPHICS**  
Steve Baldwin, Dennis Christensen, Robert Drew, Bruce Hedin, Jane Preston

**PRODUCTION DEPARTMENT**  
Joan Ahern, Frances Benton, Fiona Davies, Linda Drew, Bob Dukette, Sandra Dukette, Kenneth Jackson, Pat Mackowsky, Theresa Ostebo, Sharon Phinney, Dianne Ritson, Deborah Stone, Susan Symonds, Anne Vadeboncoeur, Irene Vail, Judi Wimberly, Donna Wohlfarth

**PHOTOGRAPHY**  
Terrie Anderson, Paul Babich, Kathy Birkebak, William Heydolph, Thomas Villeneuve

**TYPESETTING**  
Sara Bedell, Michele DesRochers, David Hayward, Stephen Jewett, Mary Kinzel, Kelly Smith, Karen Stewart

**DESIGN CONSULTANTS**  
Invisible Inc.  
Elaine Cheever, Corporate Designer  
Denzel Dyer, Howard Happ, Laurie MacMillan, Joyce Pillarella, Susan Stevens

**CORPORATE CONTROLLER**  
Roy A. Johnson

**EXECUTIVE ASSISTANT**  
Leatrice O'Neill

**ACCOUNTING MANAGER**  
Knud Keller

**DIRECTOR OF MARKETING**  
603-924-7296

Debra Boudrieau  
**CIRCULATION**

Doris Day, Pauline Johnstone, Dion Owens, designer

**BULK SALES MANAGER**  
Ginnie Boudrieau

**ASSISTANT TO THE PRESIDENT**  
Matthew Smith

**ADVERTISING**  
603-924-7138  
Louise Caron, John Gancarz, Susan Martin, Hal Stephens, Marcia Stone, Office Mgr.

## APPLICATIONS

### 52 Focus In on Your Financial Picture Jim Shreeve

This program puts you in control of your purse strings.

### 146 Keep in Tune with the Times Joel Shapiro

For music buffs who tape music from records.

### 178 Put to the Test By a Computer Leonard T. Meuer

Administering competency exams by computer.

PET

## BUSINESS

### 80 Made-to-Order Business Forms Marilyn H. Deibert

Generate professional-looking order forms.

Heath

## GENERAL INTEREST

### 84 Around the World with Videotext Henry and Elizabeth Urrows

The U.S. must plan some bold moves to compete in the videotext market.

### 176 WordStar RoadMap Charles R. Perelman

A shortcut for the "Cadillac of word processors."

## GRAPHICS

### 102 Lights...Camera...Action James M. Hansen

Here's the ideal "eye for your computer."

### 166 Parti-Colored Picture Pad M.L. Shore and L.K.R. Williams

Use your computer as a color slate to draw pictures.

## HARDWARE

### 66 Putting the Joy Back into Programming Frank Donato

Program your PET with a joystick.

PET

### 124 TRS-80 Printer for the Pet Joseph W. Verzino

Interface the Quik Printer II to the PET 2001.

### 136 Arm the OSI with Parallel Ports Roy Griffin

Construct a parallel port board for the CIP.

OSI

## MEDICAL

### 32 Open Heart Surgery with an Apple Elliot S. Kanter

In this life or death situation, surgeons rely on an Apple.

Apple

### 40 Just What the Doctor Ordered W.J. Blight

This doctor found the cure for paperwork.

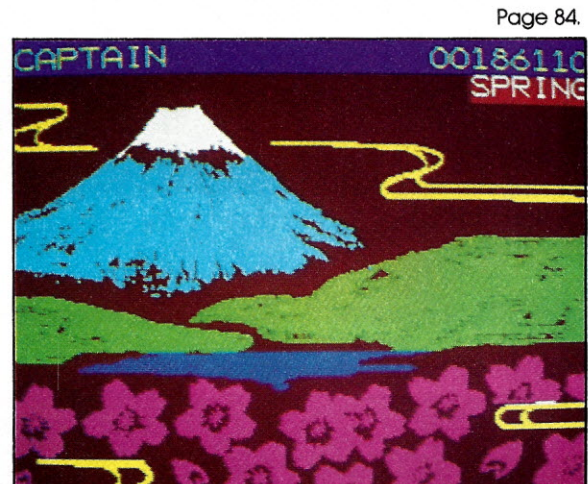
### 48 Microsystems for the Dental/Medical Office E.J. Neiburger

An Apple for the dentist.

Apple



Page 32.



Page 84.



# Contents: November 1981

Volume V  
No. 11

## REVIEWS

Apple	James E. Kelley, Jr.	<b>How Does the Apple III Stack Up?</b>	72
		Putting the Apple III through its paces.	
	Frank J. Derfler	<b>RCA's "Connection to the Computer World"</b>	94
		A portable, color terminal for RS-232-C computers.	
PC-8000	G. Michael Vose	<b>Japanese Invasion: Part III</b>	110
		The greatest threat yet: NEC's PC-8000.	
Apple	David C. Goodfellow	<b>What You See Is What You Get</b>	130
		This Apple word processor shows how your page will be printed.	

## SOFTWARE

	Lee Bonnifield	<b>Surefire Timer Programs</b>	62
		Z-80 and 8080 multiple interval timers that provide exact delays.	
PET	Robert Baker	<b>A BASIC Assembler for the PET</b>	114
		Here's a powerful, easy-to-use BASIC assembler.	
	H.S. Gentry	<b>Sorting Techniques Explained</b>	156
		Bubble vs straight insertion vs quick.	
1802	Barry Erick	<b>1802 Editor/Assembler</b>	162
		Modifications for the Elf II.	
	Murray L. Lesser	<b>Compiled vs Interpreted BASIC</b>	180
		Which one has the advantage?	

## DEPARTMENTS

<b>Editors' Notes-6</b>	<b>Calendar-212</b>
<b>PET-pourri-10</b>	<b>New Products-214</b>
<b>Dial-up Directory-16</b>	<b>Classifieds-222</b>
<b>Computer Blackboard-20</b>	<b>Club Notes-222</b>
<b>Micro Quiz-23</b>	<b>Dealer Directory-223</b>
<b>Micro-Scope-24</b>	<b>New Software-224</b>
<b>As the Word Turns-28</b>	<b>Book Reviews-228</b>
<b>Letters to the Editor-30</b>	<b>Software Reviews-234</b>
<b>Corrections-134</b>	<b>Perspectives-242</b>

## This month:

The editorial staff of *Kilobaud Microcomputing* receives many requests for copies of the magazine's editorial calendar. Public relations firms, advertisers and manufacturers—to help plan their promotional activities for the upcoming year—are naturally anxious to receive copies of our editorial schedule. Our writers, too, need to coordinate their writing efforts with the special issues scheduled.

Since, for the most part, *Kilobaud Microcomputing* is written by its readers, we are publishing a list of some of the major topics to be covered during the coming year. Please note that this schedule is subject to change. Editorial material should be received by the 25th of the month three months prior to the date of publication (e.g., Oct. 25 for the January issue).

So, at the risk of tipping our hand and revealing our strategy to the competition, we include the following editorial calendar to help you plan your writing schedule for the coming year. Choose a topic and start writing.

December—A look at the microcomputers recently released by IBM and Xerox

January—Micros used in scientific applications

February—Languages

March—Artificial intelligence

April—16-bit microprocessors

May—Local networking

June—Computer crime

July—Speech synthesis

August—Micros in business

September—Education

October—Hardware construction projects

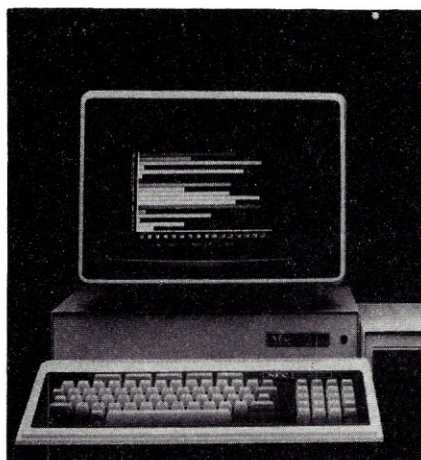
November—Micros as appropriate technology (e.g., alternative energy systems and humanistic applications).

—The Editors

## This month's cover:

Photo by Lighthearted Studio.

Page 102.



Page 110.

*Kilobaud Microcomputing* (ISSN 0192-4575) is published monthly by Wayne Green, Inc., 80 Pine St., Peterborough NH 03458. Subscription rates in U.S. are \$25 for one year and \$53 for three years. In Canada: \$27 for one year only, U.S. funds. Foreign subscriptions (surface mail)—\$35 for one year only, U.S. funds. Foreign air mail subscriptions —\$62 for one year only, U.S. funds. Canadian Distributor: Micron Distributing, 409 Queen St. West, Toronto, Ontario, Canada M5V 2A5. In Europe, contact: Monika Nedela, Markstr. 3, D-7778 Markdorf, W. Germany. South African Distributor: KB Microcomputing, PO Box 782815, Sandton, South Africa 2146. Second-class postage paid at Peterborough NH 03458 and at additional mailing offices. Phone: 603-924-3873. Entire contents copyright 1981 by Wayne Green, Inc. No part of this publication may be reprinted or otherwise reproduced without written permission from the publisher.



# Medical Breakthrough

## Doctors Computerize Practice

### Health Care and the Microcomputer

We are all only beginning to discover the real power of the microcomputer. Here I am not referring to computing power, though that continues to grow with no end in sight—machines can be picked up at a local computer store with 256K bytes of memory on board, 16-bit processors are already a fact of daily life (32-bit processors can't be far around the next bend) and hard-disk drives have arrived. As impressive as the relentless growth of computing power is, the real power of the microcomputer lies in its versatility as a tool for man—the easy way in which that computing power can be remolded into a variety of tools for various applications.

### The Proteus Machine

A single microcomputer can appear to be different things to different people—a word processor, a video game unit, a learning aid, a records storage and retrieval system and so on. (The list seems to lengthen daily.) Any one of the popular microcomputers can do any of these things and much more, depending simply on the software being used.

It is this ability to change hats at the insertion of a floppy disk that makes the microcomputer such a powerful tool in many settings. Perhaps nowhere can more of the microcomputer's abilities be used than in the health-care industry. Providers of health-care services (doctors, dentists, clinics, etc.) have a number of problems in common with other professions and small businesses—book-keeping, billing and calculating employees' salaries, to mention a few. There are

a number of fine microcomputer software packages available to help with such tasks. But there are a number of more interesting problems peculiar to the health-care industry.

### Medical Networking

Such a network would give a physician immediate indices of the latest medical articles. It could be used to put doctors in contact with one another in new ways. Instead of having to consult a specialist by telephone or in person and mailing or delivering patient records, the necessary information could be transmitted via the network. The specialist would have it im-

---

Perhaps nowhere can more  
of the microcomputer's  
abilities be used than  
in the health-care industry.

---

mediately, and could review it at his first opportunity, then transmit his recommendations back to the requesting physician. This might not only increase the efficiency of delivering medical care, but also help to decrease the cost of such care.

A network of this sort could also give doctors access to expert programs that are being developed by several researchers. Such programs reproduce the special diagnostic skills of medical specialists. These programs collect data on a patient's symptoms, case history, test results and so forth. Acting much like a hu-

man diagnostician, the program then decides which possibilities to delve into, asks specific questions about a possible illness and then suggests a diagnosis.

### Special Health-Care Problems

Some of these problems have to do with handling several different kinds of insurance forms, maintaining up-to-date appointment schedules and dealing with extensive patient records. Two articles in this issue address this class of problems. There seems to be little commercially-available microcomputer software to aid the health-care professional in this area. But much can be done by modifying existing software, and a number of practitioners (doctors and dentists) who have developed their own software are usually willing to market or in some way share it. If a doctor or dentist wants a computerized office, it is no longer necessary to become (or hire) a programmer to design a special system. And it should be getting easier. (In fact, we hope to keep you aware of what is available and how further information can be obtained.)

There is another group of medically related problems that the microcomputer can also help solve. It is often necessary for a doctor or dentist to seek expert advice on a diagnosis or therapy. Traditionally, this has been handled by either consulting with a specialist or studying medical books and journals.

Computers can aid in this process in a number of ways. A special medical network that physicians could access by using an office microcomputer in a terminal mode (which makes the computer act like a terminal) could put an immense amount of information at their fingertips.





# META TECHNOLOGIES

161



26111 Brush Avenue, Euclid Ohio 44132

CALL TOLL FREE 1-800-321-3552 TO ORDER

IN OHIO, call (216) 289-7500 (COLLECT)

## 1001 THINGS TO DO WITH YOUR PERSONAL COMPUTER

BY MARK SAWUSCH

333 pages \$7.95

333 pages, written in simple terms, of "what-to-do" and "how-to-do-it". Suitable not only for microcomputers, but for programmable calculators as well. Includes program listings, formulas, a glossary of computer terms and more! Definitely a MUST BUY!

### A PARTIAL LIST OF APPLICATIONS

Real Estate Evaluation	Test Your Typing Speed
Astrology	Finances & Investments
Income Tax	Biorythm
Speed Reading	Energy Efficiency
Personality Test	Antenna Design
Statistical Analysis	Letter Writing
Logic Circuit Analysis	Recipe Index/Calculator
Carpenter and Mechanic's Helper	
General Purpose Clock Timer	

## "OTHER MYSTERIES" VOLUME III

by Dennis Kitsz

Call now and place your order for this new book, "THE CUSTOM TRS-80™ & OTHER MYSTERIES", from IJG, Inc. More than 300 pages, with over 60 photographs, of projects for the hardware hobbyist. Includes schematics, PC layouts, software driver code, etc. for such do-it-yourself undertakings as high resolution graphics, reverse video, real-time clock/calender, music synthesis, ROM/RAM additions and more!

THE CUSTOM TRS-80™ ..... \$29.00  
CALL FOR AVAILABILITY

## MICROPARAPHERNALIA

NEWDOS by APPARAT

NEWDOS/80 by Apparat ..... \$139.95

NEWDOS UPGRADE ..... CALL

NEWDOS + with ALL UTILITIES

35-track ..... \$69.95

40-track ..... \$79.95

### BOOKS

TRS-80™ DISK

AND OTHER MYSTERIES .. \$19.95

MICROSOFT™ BASIC DECODED \$29.95

## META NOTATIONS...

MTC introduces its FREE computer "bulletin board" service. Set up your terminal or terminal software for 300 baud, parity disabled, 8-bit word length, and 1 stop bit. Dial (216) 289-8689. After the connection is established, type LOGIN META. When asked for a validation code, type META. Have fun!

In a couple of months MTC will introduce the successor to AIDS-III/CALCS. It is called AIDS/P® and is based on MTC's PRIMAL® (Practical Relational Information Management Applications Library), a powerful system for PRIME minicomputers. AIDS/P features the best of the critically acclaimed AIDS-III/CALCS but is probably an order of magnitude beyond it in power. It will be first made available to AIDS-III/CALCS owners (for an upgrade charge), then to the general public. Price will be in the \$200-\$300 range.

Effective September 1, 1981, Metatronics Corporation became a subsidiary of MTC. Metatronics will carry the complete MTC product line in addition to its own. Order processing and fulfillment departments have been combined to improve service response levels. MTC's superior software and supplies marketing, and Metatronics exceptional peripheral offerings should prove to be a formidable combination. (Sorry guys, if you can't beat us, join us...)

MTC now offers a more complete selection of diskette products (ad deadlines prevented inclusion in anything but this column). New manufacturers are MAXELL and 3M. Definitely call for specific information. For example, MAXELL Brand 5 1/4" diskettes in a PLASTIC LIBRARY CASE are only \$34.95 for a box of 10! SCOTCH Brand diskettes are comparably value-priced. MTC is also introducing its own PARAGON® Brand media products. The intent is to offer a super-high quality product at a very competitive price. For example, a box of 10 single-sided, soft-sectored, double-density, 100% certified diskettes with HUB RINGS is only \$24.95! A full line of products (including HEAD CLEANING KITS, etc.) will be offered. The PLAIN JANE® (almost 200,000 units sold) diskette line will become part of the PARAGON® MAGNETICS operation (but don't quote us verbatim).

## Let your TRS-80™ Test Itself With THE FLOPPY DOCTOR & MEMORY DIAGNOSTIC

by David Stambaugh

A complete checkup for your MODEL I or MODEL III. THE FLOPPY DOCTOR-Version 3 completely checks every sector of single or double density 35-, 40-, 77-, or 80-track disk drives. Tests motor speed, head positioning, controller functions, status bits and provides complete error logging. THE MEMORY DIAGNOSTIC checks for proper write/read, refresh, executability and exclusivity of all address locations. Includes both diagnostics and complete instruction manual.

SYSTEM DIAGNOSTICS .. \$24.95

For MODEL III ..... \$29.95

Single Sided, Soft-Sectored 5 1/4-inch,  
(for TRS-80™) Mini-floppy

## DISKETTES

**\$19.95** box of 10

## PLAIN JANE™

These are factory fresh, absolutely first quality (no seconds!) mini-floppies. They are complete with envelopes, labels and write-protect tabs in a shrink-wrapped box.

PLAIN JANE™ Diskettes ..... \$19.95

## PLAIN JANE™ Gold

Introducing MTC's premium generic diskette. Single-Sided, Soft-Sectored, DOUBLE-DENSITY, 5 1/4-inch diskettes with reinforcing HUB-RINGS. Individually 100% ERROR-FREE certified. Invest in GOLD!

PLAIN JANE™ Gold ..... \$24.95

VERBATIM'S PREMIUM DISKETTES

## DATALIFE™

Seven data-shielding improvements mean greater durability and longer data life. These individually, 100% error-free certified diskettes feature thicker oxide coating, longer-lasting lubricant, improved liner, superior polishing and more! Meets or exceeds IBM, Shugart, ANSI, ECMA and ISO standards.

VERBATIM DATALIFE™ DISKETTES

5 1/4-inch (box of 10)

MD525-01 ..... \$26.95

10 boxes of 10 ..... (each box) \$25.95

8-inch FLOPPIES

Double-Density, FD34-8000 .. \$43.95

## 'RINGS' & THINGS

HUB RING KIT for 5 1/4" disks. .... \$10.95

HUB RING KIT for 8" disks. .... \$12.95

REFILLS (50 Hub Rings) ..... \$ 5.95

CLEANING KIT for 5 1/4" drives .. \$24.95

5 1/4-inch diskette case ..... \$3.50

8-inch diskette case ..... \$3.95

5 1/4-inch File Box for

50 diskettes ..... \$24.95

8-inch File Box for

50 diskettes ..... \$29.95

TRS-80 is a trademark of the Radio Shack Division of Tandy Corporation. DATALIFE is a trademark of VERBATIM. PLAIN JANE, AIDS-I, AIDS-III, CALCS-III, CALCS-IV, MERGE-III are trademarks of MTC.  
© 1981 by Metatechnologies Corporation, Inc.

**MOST ORDERS SHIPPED WITHIN ONE BUSINESS DAY**  
Products damaged in transit will be exchanged.

**PRICES IN EFFECT**  
Nov. 1, 1981 THRU  
November 30, 1981,  
Prices, Specifications,  
and Offerings subject to  
change without notice.

8111

### WE ACCEPT

- VISA
- MASTER CHARGE
- CHECKS
- MONEY ORDERS
- C.O.D.

- Add \$3.00 for shipping & handling
- \$3.00 EXTRA for C.O.D.
- Ohio residents add 5 1/2% sales tax.



A physician who had a computerized office could most efficiently make use of such programs via a network. He could transmit the computer-recorded case file of the patient in question to the expert program, possibly answer a few questions and receive a recommended diagnosis from the program.

These are not original ideas. Neither are they futuristic dreams of what might be available some day. The technology for such systems is available today. All we lack is sufficient impetus to put the parts together.

#### **Patient Education**

Interactive programs exist which ask for information about the user's lifestyle and habits, then give the user information about possible health hazards and life expectancy. This kind of interactive program, if available in a doctor's or dentist's office, could aid the practitioner in educating patients about specific medical situations. Interactive educational programs would also be a great service to patients and their families, who could obtain accurate, current information when needed.

#### **Monitor and Control Systems**

Dedicated microcomputer systems (small systems designed to do one job, but do it continually) have been around for a while and are beginning to appear in health-care environments. These systems may consist of "off the shelf" computers and peripherals or of specially designed inexpensive single-board computers.

Small dedicated systems can be used in hospitals to monitor and record patient "behavior"—brain-wave patterns, chemical levels in the body, etc. They can also be used to monitor and control laboratory tests. The possibilities of using microcomputers in this way are also open-ended and exist right now.

#### **In The Months Ahead**

We will continue to bring you more information on work being done with microcomputers in medicine. Articles will range from accounts of small dedicated systems designed for specific control and monitoring tasks in patient care and laboratory test analysis to programs designed to help physicians make fast, accurate diagnoses in problem cases.

Concern is often expressed that health care has become increasingly impersonal. Here, and in following issues, we will look at ways microcomputers can serve our physicians and allow them to provide more efficient patient-oriented health care. We won't be seeing computers replacing our doctors; we will see computers helping them provide more personal medical care.

We have only scratched the surface and introduced the subject in this issue. Since health care is a vital concern to all of us, patient and practitioner, we will

regularly look at new medical applications of microcomputers.

**Harold Nelson**  
**Technical Editor**

### **SofDoc—A Medical Software Exchange**

As physicians begin to develop an appreciation for the potential of the microcomputer, they apply their medical knowledge to the task of producing medical applications software. Many physicians try to market the result of their labors, but find that it is extremely difficult to track down other computing doctors. Enter SofDoc, a microcomputer software exchange.

SofDoc is the creation of Dr. James Gange of Los Angeles, California. Dr.

**Microcomputers  
should have a  
profound impact  
on the practice of medicine.**

Gange began SofDoc as a way to help some like-minded physician friends who all had some software that they were willing and eager to share with their colleagues. Since its inception about a year ago, SofDoc has been adopted as an official project by the Society for Computer Medicine, whose president is Dr. Marion Ball, the Director of Computer Services at the Temple University Medical School.

SofDoc's current offering is a collection of approximately 25 programs. Included in the package, distributed on a 5¼-inch floppy disk, are:

- programs to evaluate pulmonary function
- programs to set up a respirator
- programs to generate evaluations of lab tests such as glucose tolerance and electrolyte balance
- three programs to evaluate a patient's lifestyle, help the patient figure out why he can't give up smoking and suggest ways to improve health by changing lifestyle habits
- the ANSI standard MUMPS program, the most commonly used medically oriented language

All of these programs are written in various dialects of BASIC (with the exception of MUMPS). The disk is available to physicians for \$25. A physician can join SofDoc and receive the software for free by contributing software to the exchange. The programs will run on the Apple II and II Plus.

SofDoc is always on the lookout for new software and is looking for competent

software editors and programmers, as well. Dr. Gange says the exchange can't pay editors at present, but can arrange to provide references in return for editing, translating to other BASICs and operating systems and debugging. SofDoc is not interested in business office software; the thrust of SofDoc is clinical application software.

In a recent interview with *Microcomputing*, Dr. Gange said that, theoretically, microcomputers should have a profound impact on the practice of medicine. Practically, however, says Dr. Gange, "This hasn't happened yet. The development of clinical applications is still in the embryonic stage." Dr. Gange speculated that growth in the field had been slowed by the difficulty in distributing medical software. This is one of the reasons he launched SofDoc (it is also one of the chief reasons for choosing this as the theme for this issue of *Microcomputing*).

For further information, write to SofDoc, c/o Dr. James Gange, 1433 Rossmore Road, Los Angeles, CA 90024.

**G. Michael Vose**  
**Microcomputing staff**

### **What to Expect From Microcomputing**

We are probably not the only editorial staff that finds it necessary from time to time to ask ourselves questions like, "Who reads our magazine?"

We find it necessary because it helps us reevaluate whether or not the content and style of *Microcomputing* are appropriate for the people who are, or, in our perception, should be, readers of the magazine. If we don't give our readers information they need and want, they will have little reason to stay with us. All readers want material presented in a clear, readable style. Of course, what is readable for a student, a small-business person, an engineer and a Ph.D. in one of the humanities will not be the same, in most cases.

#### **Style**

Most publications would consider these individuals to represent four distinct audiences. For *Microcomputing* that is generally not the case. We do not view our readers as having reached some specific academic or professional level. We obviously see our readers as having a common interest in the area of personal computing. But we also view our readers as having attained various levels of sophistication in that area. This presents some unique problems.

Some of our material is directed toward the beginning computerist—whether a twelve-year-old student or a corporate executive. This material is aimed at the individual who has access (in the home, school or office) to a microcomputer but who has little experience working with



computers.

Other material presupposes some computing expertise on the part of the reader. This material is aimed at the individual who owns a microcomputer and knows what to do with it—at least for certain applications. Individuals of this sort, also, come in a variety of ages and from a variety of backgrounds.

How do we go about presenting material to readers of differing educational and professional backgrounds whose only common interest is microcomputing?

We do it, first, by striving for clarity. We don't think you should have to spend time trying to figure out what an article means. Also, we think it should be apparent from the beginning whether or not the subject of an article will be of interest to you and appropriate for your level of experience.

We will be working harder than ever to cut through the computer jargon that has grown up around the microcomputing industry. While much of this terminology serves as a kind of shorthand, most of it is confusing to the beginner. For example, a term like *baud*, which is a holdover from the prehistory of microcomputing, does not tell the neophyte that we are talking about the rate of serial data transfer. In fact, if he looks up *baud* in a technical dictionary, he is likely to find statements about units of modulation speed or the number of signal line changes per second. We have decided, following the example of other computing publications, to use more descriptive terms like *data rate* and *bits per second* in discussions of data transmission (which is what *baud* is generally used to mean anyway).

Other terms can be actually misleading. The term *RAM*, for example, is usually used as the opposite of *ROM*. In fact, *RAM* (which stands for random-access memory) is not the opposite of *ROM* (read-only memory), since almost all *ROM* used in microcomputers is random-access memory. The real distinction is that one type of memory can be programmed and reprogrammed from the keyboard by the user and the other has its program "burned" into it and cannot be reprogrammed from the keyboard (it can only be read).

Since these terms are so widely used, we have decided to continue using them but to remind the reader from time to time that when he sees *RAM* he should think *programmable random-access memory*. In fact, this represents the general way in which we will handle computer jargon and technical terminology. We will occasionally remind the reader what such terms are used to mean in microcomputing circles. This will introduce beginners to terms that they will encounter when dealing with other computerists, and, at the same time, will preserve the shorthand value of such terms.

## Content

Another problem presented by what we believe should be our varied audience is that of article content. The material we present should cover the range of what is appropriate to the beginner to what is of interest and value to the moderately sophisticated computer user. And this range must be covered in a variety of areas—programs and programming, constructions and modifications, new applications, product reviews and so on.

How then do we choose material for *Microcomputing*?

A number of factors determine our choice of material for publication. Subject matter should appeal to as wide an

There is and will be  
a good deal more  
consumer-oriented material  
than in the past.

audience as possible. While not all articles will be of equal value to all of our readers, we try to present articles in such a way that they will all be of interest to as many of our readers as possible. Of course, some beginners will not be able to follow all construction projects or advanced programming articles. (Hopefully, these readers will recognize some significance in such articles and save them for future use.) Other readers may not feel a need for some elementary tutorial articles. (But a certain amount of review is always beneficial, and these readers are often the providers and critics of our tutorial material, thus helping to keep us all up to date.)

We want the information we offer you—whether it is about people or events in the microcomputing industry, products, applications or hardware modifications—to be as current as possible. At the same time, we will occasionally bring you information on new applications or updating modifications for older equipment provided that the equipment is still readily available to our readers.

Microcomputers and computing have undergone quite an evolution in a very few years. Microcomputing has gone from a hardware-hackers hobby to a major consumer industry (and from all indications—IBM and Xerox have just joined the field—we are still at the very beginning). Accordingly, as many long-time readers have correctly observed, *Microcomputing* is also changing and growing. There is and will be a good deal more

consumer-oriented material than in the past—reviews of new computers, peripherals, software and publications, for example. There will continue to be articles on new and interesting ways of using microcomputers. And you can expect to still find a good number of useful and just plain fun program listings in *Microcomputing*. We will, as always, be publishing quality articles on hardware construction and modification projects. There will, however, be some changes in the hardware articles we will be offering from those we offered in the past, again reflecting the changes in the field. Our criteria for hardware articles now include the following considerations:

- The material should be useful to a large number of readers.
- Components used should be readily available.
- They should offer something that is not commercially available or something that is commercially available but only at a much higher price than the costs incurred in the project.

We know our hardware articles have been useful to our readers in the past and we hope they will be even more so in the future.

## Who Should Read *Microcomputing* and Why

Almost everyone who is involved with microcomputers—from the rank beginner on up—should read *Microcomputing*. We like to think that reading our magazine should be an education. It should help you get started and help you grow in sophistication as a microcomputer user. If you are an electrical engineer or computer scientist, you may not need us; otherwise, you almost certainly do need us.

We recognize that someday some of our readers will feel they have outgrown their need for *Microcomputing*. This is inevitable, and, in fact, in a way it is one of our goals. If you reach the stage where we are no longer teaching you, we hope that you will stay with us as a contributor and critic of what we are offering.

We are trying to give you, our readers, a unique service in *Microcomputing*. Whether or not you read another publication devoted exclusively to your computer, we offer you a general overview of the entire microcomputing field as well as many specifics about your own system. If you have or use a microcomputer, you really should read a good general-interest micro-oriented publication like *Microcomputing*.

There is a great deal happening in our field and we want to help keep you informed and up to date. We also would like to hear from you. Let us know what you like and dislike about the magazine, what you would like us to review and the kinds of articles you would like to see. This can only help us to serve you better.

Harold Nelson,  
Technical Editor.



# Word Pro Enhancement

## Lets You Print Source Files

### Word Pro File Printer

I put together this little program a few days ago (Listing 1). Its sole purpose is to print a Word Pro source file, something you currently cannot do with Word Pro it-

self. Word Pro only lets you print the formatted output; you can only save and restore source files to disk.

A nice side-benefit of this program is that you don't have to load Word Pro just to look at a few files. This avoids the in-

convenience of having to kill Word Pro to reset the system.

I wrote the program for Word Pro 3, but it can be easily modified for Word Pro 4 and the 80-column machines. Simply change the value of LN in line 30 from 40 to 80. The value (LN) controls the line length. The value of LM (in the same line) controls an offset from the left margin before each line is printed. Its current value of 20 will center a 40-column line in an 80-column page. If you're changing the program for an 80-column machine, you should set this to zero, or eliminate the PRINT#4,SPC(LM) in line 300. The program is preset to only read files from drive zero as set in DR\$.

Lines 40-130 get the file name of the desired Word Pro file and open the file as a sequential data file. Note that the older command channel disk commands are used. This lets you run to any disk with any appropriate BASIC.

Line 140 reads and ignores the two-byte program load address at the front of the file. Remember that the program load address is always passed as data whenever a program file is opened as a sequential data file.

Line 200 puts the CBM 2022/2023 printer in upper/lowercase mode as normally used for listings. Lines 300-380 then read the file character by character, using a GET# command. Each character is converted from its display (screen) value to its ASCII value for the printer. The back-arrow must be specially decoded.

At the end of each printed line, the keyboard is checked to see if you want to suspend output, quit or continue (lines 400-440). When the program is printing, hitting any key will suspend output and display a short message. Hitting Q at this point will close the disk file and end the program. Hitting any other key will con-

```

10 REM WORD PRO SOURCE FILE PRINTER
15 REM
18 REM      BY: ROBERT BAKER
20 REM
25 :
30 LN=40: LM=20: DR$="0:"
32 :
33 REM SET LN TO 80 FOR WORD PRO 4
34 REM SET LM FOR LEFT MARGIN OFFSET
35 :
40 INPUT "ENTER FILENAME  ■■■■";FL$
100 OPEN 15,8,15
110 OPEN 2,8,2,DR$+FL$+".PRG,R"
120 INPUT#15,EN,EM$,ET,ES
130 IF EN<>0 THEN 1000
140 GET#2,C$,C$
190 :
200 OPEN 7,4,7: PRINT#7: CLOSE 7
210 OPEN 4,4
290 :
300 PRINT#4,SPC(LM): FOR X=1 TO LN
320 GET#2,C$: IF ST<>0 THEN 1100
330 C=ASC(C$): IF C=31 THEN C=C+192: GOTO 380
350 ON (C/32)+1 GOTO 370,380,360,370
360 C=C+64
370 C=C+64
380 PRINT#4,CHR$(C): NEXT: PRINT#4
390 :
400 GET C$: IF C$="" THEN 300
410 PRINT "PRESS ANY KEY TO CONTINUE, Q TO QUIT"
420 GET C$: IF C$="" THEN 420
430 IF C$="Q" THEN 1200
440 GOTO 300
900 :
1000 PRINT:PRINT"DISK ERROR
1010 PRINT EN;EM$,ET;ES: GOTO 1200
1100 IF ST<>64 THEN PRINT "ERROR  ST=";ST
1150 PRINT#4
1200 CLOSE 2:CLOSE 15: CLOSE 4

```

Listing 1. Word Pro source file printer.

Address correspondence to Robert W. Baker, 15 Windsor Drive, Atco, NJ 08004.



tinue the output. The program will normally quit when the end of the disk file is detected. Any disk errors will be reported and the program will terminate after closing the files.

## New VIC Happenings

The second and third program six-packs for the VIC-20 are a math improvement package for grades 1 through 6 and a collection of business and calculation programs.

By the way, Commodore is color-coding their tapes and cartridges for the VIC so you can easily identify the class of program:

Red = Games and recreational  
Blue = Educational  
Green = Business and calculation  
Black = Computing aids  
Orange = Home utilities

Speaking of cartridges, about ten cartridges are now available for the VIC. Some of the first ones available include: Invaders, Night Driver, Slot Machine, a poker game and Programmer's Aid. A Super Expander cartridge should also be available; it includes an additional 3K of random-access memory (RAM) along with graphics plotting and music writing commands. It will also let you easily change the programmable-function keys.

One other note of interest: the VIC game port accepts Atari joysticks! Commodore took this route because they feel the Atari controls are becoming an industry standard. Now, if they can just add a few simple joystick commands like the Atari 400/800 support, we'll really have something! For the time being, you must resort to the familiar PEEKs to read the joystick from BASIC.

## VIC-PET Tapes

The VIC-20 was designed to be somewhat compatible with the existing PET/CBM machines, with certain limitations. You need to take a few precautions when loading PET/CBM programs into a VIC, or VIC programs into a PET/CBM.

A standard BASIC program tape created on a PET/CBM will load into a VIC without any problems, assuming that the program is reasonably small in size and will fit into the somewhat limited memory space of the VIC. The VIC will actually load the program at the start of available memory and correct the program link addresses.

A machine-language program tape created on a PET/CBM will normally not load into a VIC—you'll usually get a load error. Even if you don't, the machine-language program will probably not function properly, if it will run at all. All low memory pointers and the entire operating system ROM have been changed in the VIC.

A BASIC program tape created on a VIC

can be loaded into a PET/CBM, but a few PEEKs are usually required before you can LIST or RUN the program. If you have a VIC without any memory expansion, BASIC programs are stored starting at location 4097 (\$1601 hex).

When you load a VIC program into a PET, it will be stored at the same address. However, a BASIC program in the PET normally starts at location 1025 (\$0401). Thus, you must do a POKE 41,16 on the PET to set the starting address for BASIC to match the VIC-20. Also, you must do a POKE 4096,0 to put a zero byte before the first byte of the BASIC program for the PET's BASIC operating system to function properly. Once these two PEEKs are performed you should be able to list or run the VIC program in the PET as normal.

If you add the Super Expander cartridge to the VIC, then the starting address for BASIC programs will be lower. Actually, they'll start at the same address as on the PET. Any programs created on an expanded VIC-20 will then be directly loadable on a PET/CBM system without doing any PEEKs.

The two different starting addresses for VIC programs may present a few problems, but there is a simple way to check a program tape before actually attempting to load it. This procedure will work on any Commodore system, but the addresses must be changed for the VIC-20 since its tape buffer has been moved.

First, mount the desired program tape in the drive (TAPE#1 if a PET/CBM). Then enter an OPEN 1 command on the keyboard and press the recorder play button. The program name will be displayed once it is found. When the tape stops and READY reappears, enter the following command to find the starting address of the program on the tape:

```
PET/CBM: PRINT PEEK(635) + (256 * PEEK(636))
VIC: PRINT PEEK(829) + (256 * PEEK(830))
```

If you want to find the last address of the program you can enter:

```
PET/CBM: PRINT PEEK(637) + (256 * PEEK(638))
VIC: PRINT PEEK(831) + (256 * PEEK(832))
```

This can tell you whether or not the program will fit into your machine without even trying to actually load it. Also, you can check that the tape is really a program by doing a

```
PET/CBM: PRINT PEEK(634)
VIC: PRINT PEEK(828)
```

If the value displayed is a one, then the tape does contain a program and not a data file.

These PEEKs are actually checking the data contained in a file header on the tape that is read into memory by the OPEN 1 command. Every PET, CBM or VIC tape file (whether program or data) contains a header that describes the type of file, the starting and ending addresses of program files and the file name. An OPEN command simply finds the appropriate tape file, reads the file header and then stops the tape. You can open any type of tape file but you can't read a program file from tape as data.

## Programmable VIC Characters

Remember that the VIC-20 has a programmable character set. The normal character ROM may be overridden by programmable character sets contained in RAM. To produce these programmable color characters, the VIC-20 uses three areas of memory: character pointers, display characters and color pointers.

The character pointer area contains a pointer for each particular character to be displayed. This table is referred to as the video matrix and is typically 506 bytes in length in RAM.

The character area consists of eight- or 16-byte blocks, called cells, which contain the actual dot patterns to be displayed. These character cells can be stored in ROM or RAM, depending on how they are to be used. This is the table that can be modified to create your own special character set.

The color pointer area is referred to as the color matrix. The four-bit color pointers define the color of any character to be displayed and selects one of the two color modes available.

The operating system organizes the video matrix, color matrix and character cells into the proper format to display the desired data on the screen. A typical video matrix defines 23 rows of 22 characters. This yields 506 character-display locations with a screen resolution of 176 horizontal by 184 vertical dots. Each of these character-display locations has a corresponding character pointer, or index, which points at a character pattern that is to be displayed at that particular location.

32768	UPPERCASE AND GRAPHICS	\$8000
33792	UPPERCASE AND GRAPHICS REVERSED	\$8400
33816	UPPER AND LOWERCASE	\$8800
35840	UPPER AND LOWERCASE REVERSED	\$8C00
36863		\$8FFF

VIC character generator ROM.

At the time I was writing this column, Commodore was getting ready to release a programmable character editor program for the VIC-20. This program makes the creation of special character sets a real snap. You can save a character set on tape and later load it with a BASIC program for use in game graphics or whatever. A relocating loader that was still being developed is supposed to allow multiple sets of 64 characters to be loaded one after the other so that upper- and lower-case can be programmed.

The character editor program allows you to specify each point of an 8-by-8 mask for each character in the set. One nice feature allows you to build a picture made of more than one character. You can



## MMSFORTH VERSION 2.0: MORE FOR YOUR RADIO SHACK TRS-80 MODEL I OR MODEL III !

- ★ **MORE SPEED**  
10-20 times faster than Level II BASIC.
- ★ **MORE ROOM**  
Very compact compiled code plus VIRTUAL MEMORY makes your RAM act larger. Variable number of block buffers, 31-char. unique word-names use only 4 bytes in header!
- ★ **MORE INSTRUCTIONS**  
Add YOUR commands to its 79-STANDARD-plus instruction set!  
Far more complete than most Forths: single & double precision, arrays, string-handling, clock, more.
- ★ **MORE EASE**  
Excellent full-screen Editor, structured & modular programming  
Word search utility  
THE NOTEPAD letter writer  
Optimized for your TRS-80 with keyboard repeats, upper/lower case display driver, full ASCII, single- & double-width graphics, etc.
- ★ **MORE POWER**  
Forth operating system  
Interpreter AND compiler  
8080 Assembler  
(Z80 Assembler also available)  
Intermix 35- to 80-track disk drives  
Model III System can read, write & run Model I diskettes!  
VIRTUAL I/O for video and printer, disk and tape (10-Megabyte hard disk available)

# mmsFORTH

### THE PROFESSIONAL FORTH FOR TRS-80

(Over 2,000 systems in use)

MMSFORTH Disk System V2.0 (requires 1 disk drive & 16K RAM, 32K for Model III) ..... \$129.95\*

### AND MMS GIVES IT PROFESSIONAL SUPPORT

Source code provided  
MMSFORTH Newsletter  
Many demo programs aboard  
MMSFORTH User Groups  
Inexpensive upgrades to latest version  
Programming staff can provide advice, modifications and custom programs, to fit YOUR needs.

MMSFORTH UTILITIES DISKETTE: includes FLOATING POINT MATH (L2 BASIC ROM routines plus Complex numbers, Rectangular-Polar coordinate conversions, Degrees mode, more), plus a full Forth-style Z80 ASSEMBLER; plus a powerful CROSS-REFERENCER to list Forth words by block and line. All on one diskette (requires MMSFORTH V2.0, 1 drive & 32K RAM) ..... \$39.95\*

FORTHCOM: communications package provides RS-232 driver, dumb terminal mode, transfer of FORTH blocks, and host mode to operate a remote TRS-80 (requires MMSFORTH V2.0, 1 drive & 32K RAM) ..... \$39.95\*

THE DATAHANDLER V1.2: a very sophisticated database management system operable by non-programmers (requires MMSFORTH V2.0, 1 drive & 32K RAM) ..... \$59.95\*

MMSFORTH GAMES DISKETTE: real-time graphics & board games w/source code. Includes BREAKFORTH, CRASHFORTH, CRYPTOQUOTE, FREEWAY, OTHELLO & TIC-TAC-FORTH (requires MMSFORTH V2.0, 1 drive & 32K RAM) ..... \$39.95\*

Other MMSFORTH products under development

### FORTH BOOKS AVAILABLE

MMSFORTH USERS MANUAL - without Appendices, for non-owners ..... \$17.50\*

STARTING FORTH - best companion to our manual ..... \$15.95\*

INVITATION TO FORTH - detailed beginner book on figFORTH ..... \$17.50\*

THREADED INTERPRETIVE LANGUAGES - advanced, excellent analysis of MMSFORTH-like language ..... \$18.95\*

PROGRAM DESIGN & CONSTRUCTION - intro. to structured programming, good for Forth ..... \$13.95\*

FORTH 79 STANDARD MANUAL - official reference to 79-STANDARD word set, etc ..... \$13.95\*

FORTH SPECIAL ISSUE, BYTE Magazine (Aug. 1980) - we stock this collector's item for Forth users and beginners ..... \$4.00\*

\* ORDERING INFORMATION: Software prices include manuals and require signing of a single system, single-user license. SPECIFY for Model I or Model III! Add \$2.00 S/H plus \$3.00 per MMSFORTH and \$1.00 per additional book; Mass. orders add 5% tax. Foreign orders add 20%. UPS COD, VISA & M/C accepted; no unpaid purchase orders, please.

Send SASE for free MMSFORTH information.  
Good dealers sought.

Get MMSFORTH products from your  
computer dealer or  
**MILLER MICROCOMPUTER  
SERVICES (K11)**

61 Lake Shore Road, Natick, MA 01760  
(617) 653-6136 ✓ 255

specify each character in a 3-by-3 grid when creating the special character. After seeing the preliminary version at work, the final version with good documentation should be nice when it's available.

## VIC Memory Maps

I've included a few simple memory maps for the new VIC-20. If you look closely, you'll see that the low memory pointers have been changed and the cassette buffer was moved slightly from the PET/CBM design. Commodore is providing extensive information on the VIC, making it much easier to work with. There already is complete documentation (38 pages) available on over 36 user-callable operating system routines. The documentation includes the entry address, parameters expected and what registers are used, and preparatory routines required, error returns, stack requirements, a written description of the routine operation and sample calls. Hopefully this kind of support should help generate some interesting software from outside sources.

## Miscellaneous

I just received sample issues of an interesting magazine from England called *Microcomputer Printout*. It proclaims to be "a plain man's guide to personal computing" and specializes in the PET. The two copies I received were excellent, with 68 pages full of interesting material. The advertisements were rather different, since there were a number of items from Europe that I haven't seen here in the states. The style of the magazine is much like that of *Compute*, but is almost entirely aimed at the PET.

A usual 12-month airmail subscription for us here in the USA is a steep \$58. However, the publisher is offering our readers a special half-price deal until Dec. 31 if you mention this column. At

\$29 for 12 issues, it's a bit more reasonable. Address orders and correspondence to: *Microcomputer Printout*, PO Box 48, Newbury, Berkshire RG16 0BD, England.

The latest *JINSAM Newsletter* tells about NASA's unique applications using 8032 CBM systems and JINSAM 8.0. They are using one system to keep track of recovery equipment and usage of equipment for the Columbia Shuttle. With five emergency landing sites around the world and one set of recovery equipment, it currently takes 17 C-130 transport planes to move everything. Just imagine that a CBM system like yours is keeping track of all those millions of dollars of equipment!

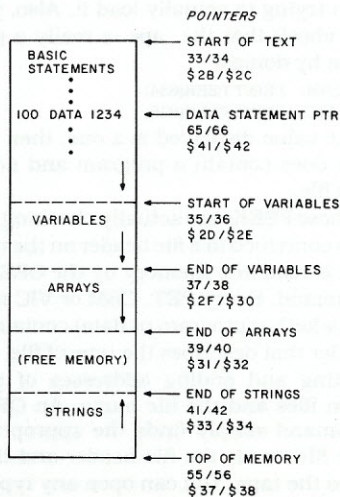
JINSAM 8.0 is also being used by engineers at the Central Instrumentation Facilities to store readings from transducers at Kennedy Space Center, on the Columbia, or at any of ten worldwide tracking locations. JINSAM is used to analyze the information as received and produces reports for maintenance, efficiency ratings, etc. Several other current and future applications were also mentioned in the summer newsletter, making rather interesting reading. □

DECIMAL		HEX
36864		\$ 9000
37136	VIC	\$ 9110
37888	1/0 - 0	\$ 9400
38912	COLOR RAM	\$ 9800
39936	1/0 - 2	\$ 9C00
40960	1/0 - 3	\$ A000
	EXPANSION ROM	
49152	8K	\$ C000
	BASIC ROM	
57344	8K	\$ E000
	KERNAL ROM	
65535	8K	\$ FFFF

VIC memory map (upper 28K).

DECIMAL		HEX
0	BASIC WORKING STORAGE	0
144	KERNAL WORKING STORAGE	\$ 0090
256	BASIC AND KERNAL STACK	\$ 0100
512	BASIC AND KERNAL WORKING STORAGE	\$ 0200
828	TAPE BUFFER	\$ 033C
1024	EXPANSION RAM (SUPER EXPANDER CTG)	\$ 0400
4096	BASIC STATEMENTS, ETC.	\$ 1000
7680	SCREEN RAM	\$ 1E00
8192	EXPANSION RAM / ROM	\$ 2000
32768	24K	\$ 8000
36863	CHARACTER ROM	\$ 8FFF
	4K	

VIC memory map (lower 36K).



VIC BASIC storage.



# Standard & Poor's unique software and data system—STOCKPAK—can help you manage your investments like a Wall Street Professional! Now for TRS-80 Model I and Model III users too!

STOCKPAK not only delivers a "stand-alone" Portfolio Management System but also gives you the software for Standard & Poor's monthly Common Stock Data Service (available to TRS-80 owners on a subscription basis). With STOCKPAK and the Data Service you command one of the most powerful and versatile investment tools available.

## Here's How STOCKPAK Will Help You:

### A 900 COMPANY DATA BASE SERVICE

Monthly Data Service subscribers receive a diskette containing 30 vital financial items on 900 of the most widely traded stocks (S&P "500" and 400 NYSE, ASE and OTC issues). Accompanying this monthly diskette is an Investor's Newsletter highlighting important financial news and investment strategies, with suggestions for maximizing the usefulness of the system.

### STOCKPAK SELECTION SYSTEM

The heart of STOCKPAK is a powerful, analytical stock selection tool which enables investors to choose stocks which meet their investment criteria. For example, you may wish to select only those oil and gas stocks with price/earnings ratios of less than 7 and yields of 6% or more. Once a group of stocks has been selected, you can store it as a separate data file for continuing use.

### REPORT WRITER

You can define the report formats you would like to see on those stocks meeting your investment objectives. Hundreds of calculations and ratios that you define can be sorted, averaged or totalled, and displayed on video screen or optional printer.



### PORTFOLIO MANAGEMENT SYSTEM

Now you can effectively evaluate and manage your own stock portfolio of up to 100 securities with as many as 30 transactions for each. You can record "buy" and "sell" transactions, price and dividend information and stock splits for instant retrieval, for record keeping and tax purposes. You can measure actual performance or create hypothetical situations to help you make "buy" or "sell" decisions.

### HOW TO ORDER STOCKPAK

STOCKPAK is designed exclusively for TRS-80 users with 32K business systems with two mini-disk drives. You can obtain the basic software and sample Data Base, plus a comprehensive User's Manual from your local Radio Shack Store for only \$49.95. The STOCKPAK Monthly Data Updating Service can be ordered directly from Standard & Poor's for \$200 annually, or from the order form provided in the basic package you purchase from Radio Shack.



**Standard & Poor's Corporation** ✓ 60

25 BROADWAY, NEW YORK, NY 10004 (212) 248-3993/3374



# The \$149<sup>95</sup> personal computer.



## Introducing the Sinclair ZX81

If you're ever going to buy a personal computer, now is the time to do it.

The new Sinclair ZX81 is the most powerful, yet easy-to-use computer ever offered for anywhere near the price: only \$149.95\* completely assembled.

Don't let the price fool you. The ZX81 has just about everything you could ask for in a personal computer.

### A breakthrough in personal computers

The ZX81 is a major advance over the original Sinclair ZX80—the world's largest selling personal computer and the first for under \$200.

In fact, the ZX81's new 8K Extended BASIC offers features found only on computers costing two or three times as much.

Just look at what you get:

- Continuous display, including moving graphics
- Multi-dimensional string and numerical arrays

\*Plus shipping and handling. Price includes connectors for TV and cassette, AC adaptor, and FREE manual.

- Mathematical and scientific functions accurate to 8 decimal places
- Unique one-touch entry of key words like PRINT, RUN and LIST
- Automatic syntax error detection and easy editing
- Randomize function useful for both games and serious applications
- Built-in interface for ZX Printer
- 1K of memory expandable to 16K

The ZX81 is also very convenient to use. It hooks up to any television set to produce a clear 32-column by 24-line display. And you can use a regular cassette recorder to store and recall programs by name.

### If you already own a ZX80

The 8K Extended BASIC chip used in the ZX81 is available as a plug-in replacement for your ZX80 for only \$39.95, plus shipping and handling—complete with new keyboard overlay and the ZX81 manual.

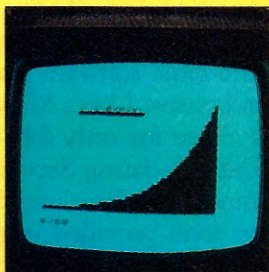
So in just a few minutes, with no special skills or tools required, you can upgrade your ZX80 to have all the powerful features of the ZX81. (You'll have everything except continuous display, but you can still use the PAUSE and SCROLL commands to get moving graphics.)

With the 8K BASIC chip, your ZX80 will also be equipped to use the ZX Printer and Sinclair software.

### Warranty and Service Program\*\*

The Sinclair ZX81 is covered by a 10-day money-back guarantee and a limited 90-day warranty that includes free parts and labor through our national service-by-mail facilities.

\*\*Does not apply to ZX81 kits.



**NEW SOFTWARE:** Sinclair has published pre-recorded programs on cassettes for your ZX81, or ZX80 with 8K BASIC. We're constantly coming out with new programs, so we'll send you our latest software catalog with your computer.



**ZX PRINTER:** The Sinclair ZX Printer will work with your ZX81, or ZX80 with 8K BASIC. It will be available in the near future and will cost less than \$100.



**16K MEMORY MODULE:** Like any powerful, full fledged computer, the ZX81 is expandable. Sinclair's 16K memory module plugs right onto the back of your ZX81 (or ZX80, with or without 8K BASIC). Cost is \$99.95, plus shipping and handling.



**ZX81 MANUAL:** The ZX81 comes with a comprehensive 164-page programming guide and operating manual designed for both beginners and experienced computer users. A \$10.95 value, it's yours free with the ZX81.



# The \$99<sup>95</sup> personal computer.

## Introducing the ZX81 kit

If you really want to save money, and you enjoy building electronic kits, you can order the ZX81 in kit form for the incredible price of just \$99.95\*. It's the same, full-featured computer, only you put it together yourself. We'll send complete, easy-to-follow instructions on how you can assemble your ZX81 in just a few hours. All you have to supply is the soldering iron.

### How to order

Sinclair Research is the world's largest manufacturer of personal computers.

The ZX81 represents the latest technology in microelectronics, and it picks up right where the ZX80 left off. Thousands are selling every week.

We urge you to place your order for the new ZX81 today. The sooner you order, the sooner you can start enjoying your own computer.

To order, simply call our toll free number, and use your MasterCard or VISA.

To order by mail, please use the coupon. And send your check or money order. We regret that we cannot accept purchase orders or C.O.D.'s.

**CALL 800-543-3000.** Ask for operator #509. In Ohio call 800-582-1364. In Canada call 513-729-4300. Ask for operator #509. Phones open 24 hours a day, 7 days a week. Have your MasterCard or VISA ready.

These numbers are for orders only. For information, you must write to Sinclair Research Ltd., One Sinclair Plaza, Nashua, NH 03061.

# sinclair

AD CODE	11KM	PRICE†	QTY.	AMOUNT
	ZX81	\$149.95		
	ZX81 Kit	99.95		
	8K BASIC chip (for ZX80)	39.95		
	16K Memory Module (for ZX81 or ZX80)	99.95		
	Shipping and Handling	4.95		\$4.95
	To ship outside USA add \$10.00			
	TOTAL			

**MAIL TO:** Sinclair Research Ltd., One Sinclair Plaza, Nashua, NH 03061.

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY/STATE/ZIP \_\_\_\_\_

† U.S. Dollars



# Life in the Fast Lane

# Modems Designed For Speed

Do you want to set up your own electronic message system? This month, we'll look at an excellent software package that lets you turn your TRS-80 into an electronic message system. I'll also review a nice terminal program for CP/M users. But first, let's talk about going fast and getting rich.

## Faster than 300 Baud

A recent discussion in this column on Bell 202 and 212 signalling has resulted in some mail on transmission speed and standards. Some of us have had the pleasant experience of moving up from a 110-baud mechanical printing terminal to a 300-baud device. The difference in performance seems much greater than the 270 percent speed-up shown by the numbers. Moving from 300 baud to 600 or even 1200 baud can make an even greater difference in your enjoyment of electronic message systems and information utilities. It can also reduce your telephone bill!

Most modems in use in the U.S. follow one of three standards established by the Bell system: Bell 103, 202 or 212. Bell 103 signalling is normally limited to a rate of 300 baud. Bell 202 and 212 standards are normally used for higher speeds, but they are very different from each other.

Other manufacturers have developed their own high-speed systems using signalling schemes different from the Bell system standards. The most common is the VA3400 protocol established by Racal-Vadic. This standard is also supported by Anderson Jacobson. Devices called "triple modems," which support Bell 103, Bell 212 and VA3400, are common in professional data communications operations.

Several companies have been able to push the 103 standard modems to speeds over 300 baud. The Potomac Micro-Magic S-100 bus integrated modem has proven its ability to operate reliably at 600 baud.

Recent versions of Microperipheral Corporation's Microconnection modems are reported to be reliable at over 300 baud.

Telephone line quality affects the ability of any modem to operate at high speeds. Successful operation at over 300 baud with any 103-type modem should always be considered a bonus. No information utility will run at over 300 baud using the Bell 300 standard, but several message systems (including the AMRAD CBBS) will.

At the higher speeds (1200 baud), there seems to be a difference of opinion in the microcomputer communications community. Several readers have written that they think it is silly for Novation to offer 202-type signalling in their Apple-Cat II when 212 is the standard for interactive communications.

However, several amateur radio operators have been thrilled by Novation's offering because the 202 protocol gives them a 1200-baud system at a low price, and the one-way-at-a-time type of operation used under the 202 scheme is perfect for their kind of transmissions. However, the hams are not in the majority and they will probably want to talk to an information utility using the high-speed 212 protocol too. (Nobody ever wants to go back to 300 baud after he has used 1200.)

## Getting Rich

There is a very large market waiting for a less expensive 1200-baud type 212 modem. Who will be the first to introduce one? Get busy and get rich! While I am on the subject of getting rich, the first person out with a simple plug-in parallel printer port for the Osborne I is sure to make a tidy sum. The opportunities to make a buck today are endless.

## European Standards

I mentioned some European message systems a few months ago and I've had some inquiries about the signalling standards used in Europe. The International

Committee on Telephone and Telegraph (CCITT) has stated its V.21 protocol this way:

300 baud Channel 1: binary 1 (mark) 980 Hz  
binary 0 (space) 1180 Hz  
Channel 2: binary 1 (mark) 1650 Hz  
binary 0 (space) 1850 Hz

If you are determined to work the European systems, you will need a modem which operates on these frequencies. A European option is available on the Microconnection devices, and Novation has a European version of its popular CAT modem.

## Call-Waiting

A recent circular from the local telephone company reminded me of a problem that many of you might be paying for in more ways than one. Do you get frustrated by mysterious interruptions in your data communications sessions? Many telephone customers have taken an option called Call-Waiting which gives a short beep on your phone line if the phone is in use when a call comes in. The second party gets a noisy crackle when the first party gets the beep. The crackle and the beep are quite enough to convince either modem that the other has quit, and a disconnect results.

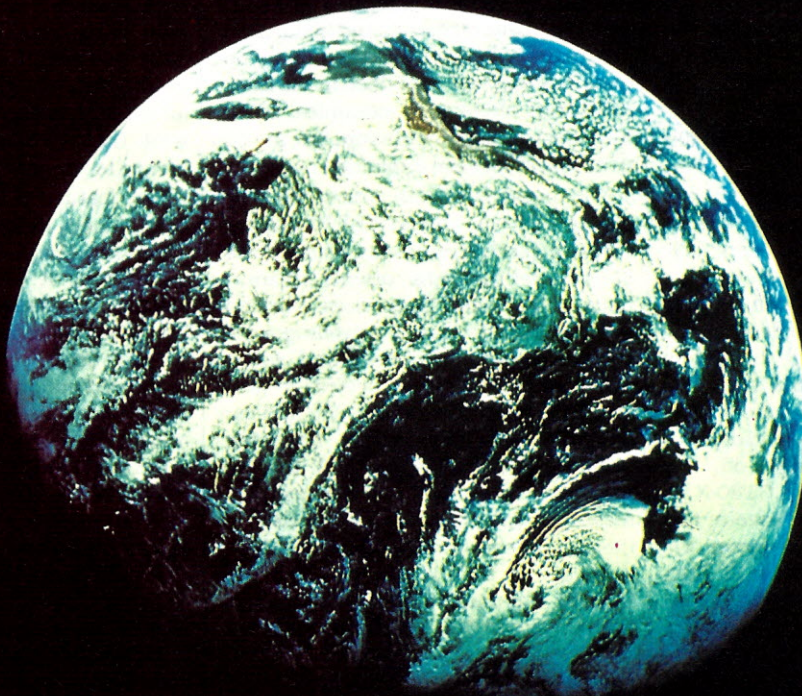
Call-Waiting and data communications don't mix. If you have it and get mysteriously dumped in the middle of a session, you know why. Incidentally, the information utilities keep billing you for a number of minutes if you just disappear without signing off. So if competition for the telephone line is a problem, a separate telephone line might be a better option than Call-Waiting for the data communicator.

## With the Information Utilities

I inspected CompuServe and The Source closely last month, but I have two quick comments: The new management at The Source has been on-board about six months now, so watch for changes. More



# THE WORLD IS YOURS



Data communications can open up a whole new world to you and your computer. A world of the future. Now. A world full of information resources, time-sharing computer systems, and electronic "bulletin boards." All you need for admission to this world is your CP/M<sup>2</sup>-based computer, a modem, and the proper software. That's where we come in. We have the proper software. **CROSSTALK**,<sup>™</sup> our smart terminal & file transfer program for CP/M, allows you to call into thousands of dial-up computer systems around the world, and communicate with them. **REMOTE**, our CP/M remote console program, allows you to operate your CP/M system from a remote terminal, giving your computer added flexibility and usefulness.

## CROSSTALK

- Allows your computer and modem to communicate with other computers, including other **CROSSTALK** systems, public-access "bulletin board" systems, main frame computers, subscription "Information utilities" such as THE SOURCE,<sup>™</sup> and much more.
- Simple, easy to use "plain English" command structure makes **CROSSTALK** easy to learn, yet provides a powerful tool for exchanging files, capturing data, and controlling modem parameters.
- Concurrent printer and video allows you to print data while viewing it on the CRT.
- Fully error-checked file transfers using 16 bit CRC protocol. Protocol transfers allow exchanging files which are larger than the system's memory.
- Built in "DIR" command.
- Data capture allows saving received data onto your disk.
- Auto-dial, redial, and auto-answer (if supported by modem).

Available for the following modems: Hayes 80-103a

Hayes Smartmodem<sup>™</sup>

Hayes Micromodem 100<sup>™</sup>

PMMI Communications MM-103

Hayes Micromodem II<sup>™</sup> for the Apple II<sup>®</sup>

Any RS-232 modem, including 1200 baud modems

## REMOTE

- Allows **remote** use of your computer from a **remote** terminal location.
- May be called as a subroutine from BASIC, PASCAL, or any other program to allow answering under program control.
- Provides nulls if needed for printing terminals.
- Uses less than 1k of memory space.
- Automatically selects proper baud rate.
- Available for S-100 modems (Hayes and PMMI) only.

For details, see your computer retailer, or contact us directly.



Microstuf, Inc. ✓253  
Box 33337  
Decatur, Georgia 30033  
(404) 491-3787 (voice)  
(404) 939-1520 (demo system)

Smartmodem<sup>™</sup> and Micromodem<sup>™</sup> are trademarks of Hayes Microcomputer Products, Inc. / Apple is a registered trademark of Apple Computers, Inc.  
CROSSTALK is a trademark of Microstuf, Inc. / CP/M is a registered trademark of Digital Research Inc.

DEALER INQUIRIES WELCOME.



features and a friendlier operating format should be coming up. Meanwhile, CompuServe is still moving at a steady pace. Its Microcomputer Advisory Service, presented by Battery Lane, is a nicely done interactive service which answers some tough questions for novice and pro microcomputer users. This dialogue is a very appropriate use of the medium.

### A TRS-80 Message System

Many microcomputer users would like to operate their systems remotely. Integrated modems like the Hayes Microcomputer Systems Micromodem have this capability built in, but TRS-80 users have been left behind. Now, Lance Micklus has come up with a program which tucks itself away in the high memory of the TRS-80 and lets you operate the system remotely through the RS-232C port. This software also prepares an auto-answer modem to answer the phone and orders it to hang up when the user signs off.

Micklus calls the program ST80-X10, and it is available in both cassette and disk versions. The same program will work with the TRS-80 Model I or III. After loading, the program will build a host subroutine in high memory, memory protect and initialize itself and return to DOS or BASIC. The computer then interacts with both the keyboard and RS-232C port. The program is simple and effective.

ST80-X10 can be even more useful when it is run with the separate Communications Center (ST80-CC) software package. This BASIC program turns an ST80-X10-equipped TRS-80 into an electronic message system. The TRS-80 must have at least 48K and two disk drives to carry an effective number of messages. This configuration will allow about 25 to 50 messages to be kept on-line—depending on how many lines you allow each message to have.

The Communications Center package operates in two modes. In the more common mode, the entire system—program and all messages—is held in RAM. The program is self-maintaining in that it will write over the least significant information first when RAM space devoted to messages is full.

The program can differentiate between four levels of users: guest, member, owner and operator. Each kind of user has a different level of privileges. The name of the user and the level of privilege assigned determine what messages a user can see.

A unique "personal only" option makes all messages not addressed to the individual invisible. This, in effect, provides a personal mailbox service. Options which allow all users to see all messages or only certain messages are available by simple commands.

In its second mode of operation, the program can allow the user access to programs stored on the disks. Programs can be run in the host system or uploaded

and downloaded between the host and remote user. A password system prevents unauthorized users from writing disk files, and only certain drives are available to normal users. This prevents the system from being crashed by vandals.

ST80-CC comes in a hardcover binder with extensive operating and installation instructions. The program has many options, but they are explained in the documentation along with examples. ST80-X10 has less documentation, but the options it provides are explained clearly.

The message system created by combining ST80-CC and ST80-X10 has particularly good potential as a communications center for clubs, private organizations, schools and businesses. Development and study teams, travelling salespeople, dealers, suppliers and others could put this message system to good use. ST80-X10 costs about \$50 and can be used alone for remote operation. ST80-CC also costs about \$50, but you need both programs for the complete message system. A cassette version of the message program called ST80-PBB is available for \$30. It will run on a 16K TRS-80. The entire ST80 line is available from the Small Business Systems Group.

### Crosstalk

Many different kinds of communications programs are available which run under the CP/M operating system from Digital Research. But most have a specific function (driving a modem or transmitting a file) or run only on certain machines (Z-Term for the Apple II with CP/M, for example). None of them brought together all of the smart-terminal features in one package able to run on most CP/M-equipped computers. Crosstalk, from the Microstuf Company, now gives CP/M data communicators smart-terminal features in one user-friendly package.

Crosstalk was originally developed for the North Star Horizon computer, using the Hayes or PMMI integrated S-100 bus modems. The program can now be adapted to run on any CP/M machine with an integral modem or a serial port, but you do have to specify either the integral or serial version when ordering.

The version for use with integral modems is easy to install because these modems always use the same I/O port locations. Serial versions for the Horizon and TRS-80 Model II computers are ready to run. The program can be configured for other computers with serial ports if you know the appropriate I/O locations. Les Freed from Microstuf offers to help his customers by phone or mail with any installation problems.

The Crosstalk program turns a CP/M-equipped computer into a terminal capable of automatically dialing prestored telephone numbers, transmitting CP/M files, saving received data in CP/M files and transferring data files using the same protocol as CLINK and other popular

file transfer programs. This feature provides very accurate file transfer, but it must be used with another machine running Crosstalk or a program with the same protocol.

Operation of the program is controlled from a menu which offers four levels of help to the user. Frequent users of the program can quickly get in and out of the menu. New or infrequent users can get all of the help they need to use Crosstalk while they are on-line, ending frantic reference to the manuals.

One feature of Crosstalk should have been done a little differently. When the program is simply transmitting a file (not transferring it with the error-checking feature), it transmits line-by-line, waiting for a carriage return before transmitting the next line.

A speed option can also put a variable-length delay between characters so that distant end systems and carrier systems are not overrun. This combination makes it possible to send prepared electronic mail files to an ABBS, CBBS or to The Source. But some systems, particularly CompuServe's EMAIL, want the transmitting program to respond only to a specific prompt other than a carriage return.

It would be difficult to send a message of over ten lines through EMAIL using Crosstalk. This limitation could be overcome if the prompt recognized by Crosstalk could be easily changed from the menu.

Crosstalk falls into the category of good, hard-working software. It is practical, but not frilly. That description fits CP/M too, so CP/M users should love it. Crosstalk is available for about \$150 from the Microstuf Company.

### Tell me!

If you have a data communications product that you think could make you rich, let me help. Drop me a line on The Source at TCB967, on CompuServe at 70003.455 or on the AMRAD CBBS at 703-734-1387. □

### Manufacturers and Suppliers

Small Business Systems Group

6 Carlisle Road  
Westford, MA 01886  
617-692-3800

The Microstuf Co.  
PO Box 33337  
Decatur, GA 30033  
404-491-3787

Racal Vadic  
222 Caspian Drive  
Sunnyvale, CA 94086  
408-744-0810

Potomac Micro-Magic  
5201 Leesburg Pike, Suite 604  
Falls Church, VA 22041  
703-750-3727

The Microperipheral Corporation  
PO Box 529  
Mercer Island, WA 98040  
206-454-3303



# TRS-80™ PROGRAMS SUPER SOFTWARE AT SUPER PRICES

## THE ULTIMATE DISK-OPERATING SYSTEM

### LDOS™

A completely documented new generation of operating system for the TRS-80. Far superior to any on the market. It is a totally independent device system, capable of device linking, routing, setting, and filtering. LDOS will support 5" and 8" floppies, single/double density, single/double sided, and up to 80 tracks. Full customer service provided with a toll free 800 number. Excellent documentation in a tab indexed manual (over 250 pages). Call or send for more information today.

Available for Model I  
or III . . . . . only \$169.00

LDOS™ is a product of  
Logical Systems Inc.

## ALSO AVAILABLE

EDAS 3.5 Model I and III . . . \$79.00  
EDAS 5.0 Model II . . . . \$179.00

Host Model II was . . . . \$199.00  
now . . . . . \$99.00

## MAILING SYSTEMS MAIL/FILE - SERIES II

NEW Series II Mail/File has all of the outstanding features of the original Series I Mail/File, PLUS many additional qualities which again will set standards for this type of system. Word processor type input editor, fast sorting, and fabulous editing capabilities are a few of its features. Name and ZIP code are under constant sort. Series II is compatible with Series I data files. Model I system will handle up to 600 names. Model III system will handle up to 1200 names. Either system available for only . . . . . \$159.00  
Also available for the Model II . . . . . \$199.00  
Handling up to 2500 names per file

## MASS/MAIL SUBSCRIPTION SYSTEM AVAILABLE FOR MODEL II. THE ULTIMATE IN MAILING SYSTEMS

"I think the system will stand the test of time . . . It is probably the most sophisticated system around for the micros today"  
Mike Schmidt (EDITOR) 80-US Jan/Feb pg. 94

Galactic's Mass/Mail System was designed with the needs of the large mailing list in mind. This system has capabilities of handling up to 10,500 records, with access times of less than 15 seconds and usual access of about one second. All adds, deletes and edits are instant for the operator and

## MAILING SYSTEMS

are then completed later in a "batch mode". The System comes complete with extensive documentation and ongoing support. . . . .

Contact Galactic Software for detailed specifications for your exact needs. Available only for the TRS-80 Model II.

## BUSINESS SYSTEMS INVENTORY MASTER SYSTEM

A program to fill your needs, handling up to 2700 items. With today's market, keeping on hand only what your demand calls for is reason enough to let your TRS-80 accurately and effectively take care of your inventory. Always know what to stock and when to stock it. Have a multitude of reports at your finger tips. This system has many features which were modeled after a main frame system of large capacity. More information available upon request.

Model I version just . . . . . \$159.00  
Model III version just . . . . . \$259.00

ALSO AVAILABLE . . .  
For the MODEL I or III  
**STOCK MARKET MONITOR**

Cassette version . . . . . \$89.00  
Disk version . . . . . \$99.00

## ULTRA-TREK GAME

Can you master this trip through the galaxies? As commander, will you be able to keep the Enterprise and its crew en route and on patrol? Can you destroy the hostile base? Order today.  
Model I or III version only . . . . . \$19.95

Send me the following:

- |  |  |
|--|--|
| <input type="checkbox"/> LDOS Model I . . . . . \$169.00                 | <input type="checkbox"/> INVENTORY MASTER Model I . . . \$159.00 |
| <input type="checkbox"/> LDOS Model III . . . . . \$169.00               | <input type="checkbox"/> INVENTORY MASTER Model III . . \$259.00 |
| <input type="checkbox"/> EDAS 3.5 Model I . . . . . \$79.00              | <input type="checkbox"/> STOCK MARKET MONITOR Model I            |
| <input type="checkbox"/> EDAS 3.5 Model III . . . . . \$79.00            | cassette . . . . . \$89.00                                       |
| <input type="checkbox"/> EDAS 5.0 Model II . . . . . \$179.00            | disk . . . . . \$99.00   |
| <input type="checkbox"/> HOST Model II . . . . . \$99.00                 | <input type="checkbox"/> STOCK MARKET MONITOR Model III          |
| <input type="checkbox"/> MAIL/FILE II Model I . . . . . \$159.00         | cassette . . . . . \$89.00                                       |
| <input type="checkbox"/> MAIL/FILE II Model III . . . . . \$159.00       | disk . . . . . \$99.00   |
| <input type="checkbox"/> MAIL/FILE II Model II . . . . . \$199.00        | <input type="checkbox"/> ULTRA TREK Model I . . . . . \$19.95    |
| <input type="checkbox"/> INFO ON MASS/MAIL MODEL II                      | <input type="checkbox"/> ULTRA TREK Model III . . . . . \$19.95  |
| <input type="checkbox"/> I WOULD LIKE MORE INFORMATION ON THE FOLLOWING: |  |

☐ CHECK ENCLOSED ☐ C.O.D. ☐ VISA CARD NO. \_\_\_\_\_  
☐ MASTERCARD NO. \_\_\_\_\_

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_

Mail to: Galactic software Ltd. 11520 N. Port Washington Rd. K81B  
Mequon, WI 53092

Can't wait? call  
**414/241-8030**



TRS-80 A Trademark of Tandy Corp.



# Let Your Micro "Strut Its Stuff"

## Problems Best Solved By Computer

Do you teach students whose programming abilities far exceed those of everyone else? Are you tired of watching your children write programs to solve problems that are more readily solved with pencil, paper and perhaps a calculator? Here are five problems that might be of interest to you. All are appropriate for secondary school students, and several can be used with mid- and upper-level elementary students. Solutions are likely to require a computer and considerable thought. All could inspire additional questions before a solution is obtained.

1. Let's begin with a briefly stated historical question. Although this problem cannot be described as realistic, the battle account on which it is based is historically accurate. The following unusual fact is known about one of the first recorded battles after the establishment of European colonists in what is now the U.S.

"The product of the year of the battle, the day of the month of the battle, the number of the month of the battle and the average length (to the nearest inch) of the bows found at the battle site is 3486810." Given the additional fact that the battle was fought in the late spring, give the exact date of the battle.

After you calculate the date of the bat-

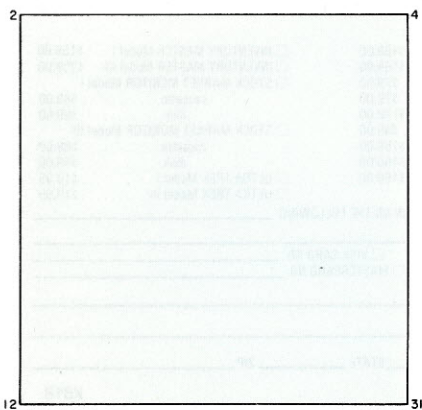


Fig. 1.

tle, you might be interested in determining who fought the battle, where they fought and why they fought. Although these questions won't involve the computer, finding answers may be tougher and more interesting than determining the date.

2. Draw a square, then choose four positive integers, each less than 100, and write them in any order at the vertices. For example, suppose you choose 2, 4, 12 and 31. You might then draw and label a square as in Fig. 1. Now draw another square inside the first as in Fig. 2. At the vertices of this square, write the absolute value of the difference of the numbers at the two corresponding vertices of the larger square. Repeat this process until you obtain a square whose vertices are all labeled with the same numbers as shown in Fig. 3. Now that this process is well understood, you're ready to address a few questions:

A. Write a program that will permit a user to enter the first four integers to be used when labeling the vertices. The output of the program should then be the numbers to be used as labels on all subsequent squares until the sequence ends with four identical labels.

B. If the first four integers are positive integers less than or equal to 15, which four numbers will generate the largest number of squares before the final square is obtained? In what order must these numbers be placed?

3. As you already know, the set of ra-

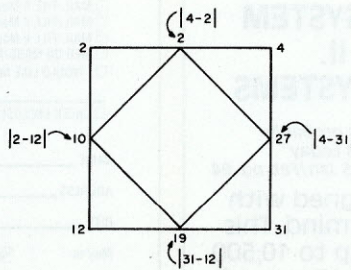


Fig. 2.

tional numbers between 0 and 1 is infinite. However, the following table will contain any specific one of these numbers if the table is extended sufficiently.

1/1					
1/2					
1/3	2/3				
1/4	3/4				
1/5	2/5	3/5	4/5		
1/6	5/6				
1/7	2/7	3/7	4/7	5/7	6/7
1/8	3/8	5/8	7/8		
1/9	2/9	4/9	5/9	7/9	8/9
1/10	3/10	7/10	9/10		
1/11	2/11	3/11	4/11	5/11	6/11
1/12	5/12	7/12	11/12		

Many interesting questions can be asked about this table of fractions. Several of these questions involve a correspondence between the counting numbers and the fractions in the table. This correspondence is based simply on the order of occurrence within the fraction table. For example, the 1st term is 1/1, the 5th term is 1/4, the 28th term is 8/9, and so forth.

Notice the term number of each term in

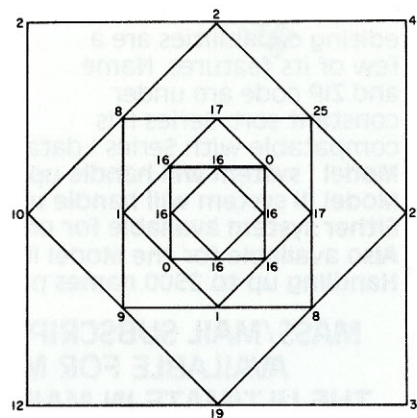
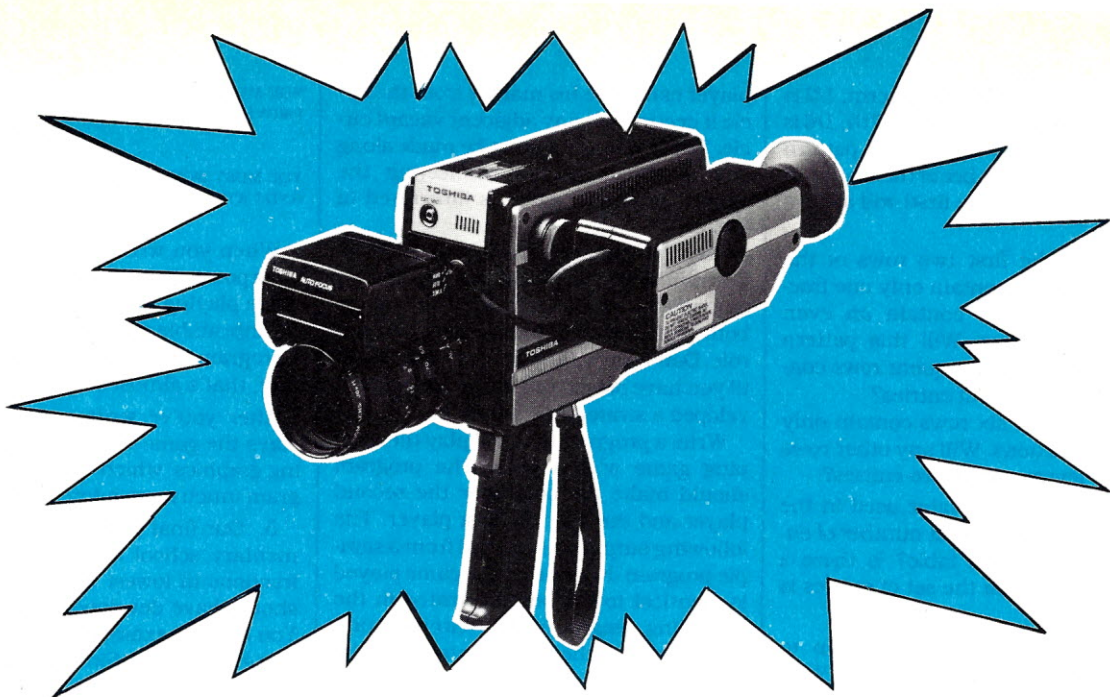


Fig. 3.

Walter Koetke, Putnam/Northern Westchester BOCES, Yorktown Heights, NY 10598.





# HOW TO GET THIS \$1,400 TOSHIBA AUTO FOCUS CAMERA FREE . . .

VIDEOPLAY magazine wants to publish plans for interesting and practical home video centers which tie together videocassette recorder/players, TV receivers, video games, stereos and what have you. If you've designed and put together such a set-up, submit your plans, pictures and a brief write-up of how it works, and you may win the top prize - a brand new, \$1,400 Toshiba color video camera with auto focus.

The Toshiba auto focus camera uses a sonar-based system to continuously and automatically adjust the lens to keep the picture sharply in focus through panning, etc. The camera is feature packed with a wide angle 6X telephoto zoom lens, automatic iris, electronic viewfinder and color correction controls. And it weighs under 5 lbs. Our July 1981 VIDEOPLAYTEST summed it all up with "The Toshiba IK-1850 auto focus camera has lots going for it."

First prize will be awarded for the construction article on the most useful, original and economical video set-up. *You must send us plans, a complete list of materials (with prices), photos and clear, step-by-step instructions for the construction of the project.* The second prize of 15 blank videocassettes worth \$300 will be awarded to the next best project. The decision of the Contest judges will be final. All descriptive materials become the property of C.S. Tepfer Publishing Co., Inc. and contestants must guarantee that their projects are not copied from a commercial product.

Each entry must include plans, a list of materials and photos and an entry form such as the one below. All entries must be postmarked no later than November 25, 1981. If the contestant is under 18 years of age, the entry must also be signed by a parent or guardian.

## VIDEOPLAY HOME VIDEO CENTER CONTEST ENTRY FORM

Please enter the enclosed project in your Home Video Center Contest. I have built the unit described and guarantee it is not a copy of a commercial product, nor does it infringe on any patents to my knowledge. I understand that the decision of the judges is final and that my descriptive materials become the property of the C.S. Tepfer Publishing Co., Inc.  
(signed) \_\_\_\_\_

VIDEOPLAY magazine  
Video Center Contest  
51 Sugar Hollow Rd., Danbury, CT 06810

K

Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_  
Daytime telephone number (    ) \_\_\_\_\_  
Evening number (    ) \_\_\_\_\_



the first column.  $1/1$  is the 1st term,  $1/2$  is 2nd,  $1/3$  is 3rd,  $1/4$  is 5th,  $1/5$  is 7th,  $1/6$  is 11th,  $1/7$  is 13th, . . . Does this pattern indicate that the number of the first term in each row (except the first) will always be prime?

Except for the first two rows of the table, which each contain only one fraction, all other rows contain an even number of fractions. Will this pattern continue? Will all subsequent rows contain an even number of entries?

Five of the first six rows contain only one or two fractions. Will any other rows contain as few as one or two entries?

What is the denominator used in the line containing the largest number of entries in the extended table? Is there a single line for which the set of entries is infinite?

Your task is to write a program to answer these and similar questions. Your program should permit the user to enter the number of a term. The program should then calculate and print the fraction corresponding to that term. For example, if the user enters 8, the fraction  $2/5$  should be printed. If the user enters 1032, the fraction . . . let your program calculate this one.

An alternative program would permit the user to enter the numerator and denominator of a fraction, and would then calculate and print the number associated with that fraction. If you feel that this or your own alternative program will better answer the suggested questions, write the program you prefer. Efficiency will be important no matter which form you choose to write; your program must complete all computations within a reasonable time.

4. The trapping game is a quickly-learned board game played by two players. The board consists of seven circles connected by line segments representing paths between the circles, as in Fig. 4. The circles are numbered 1 through 7 for easy reference. The first player has one marker which is placed in circle 1. This player can win the game in either of two ways. He wins if he can make any ten moves or if he can move his marker to circle 7. The second player has three markers that are placed in circles 5, 6 and 7. The second player can win only by trapping his opponent's marker. Players alternate moves, the player with the single marker always moving first. A

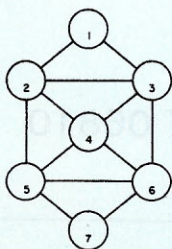


Fig. 4.

player can move his marker from the circle it occupies to any adjacent vacant circle. This movement must be made along one of the segments connecting the circles. A sample game is illustrated in Fig. 5.

Play the trapping game with a friend. You can draw the board and use almost any objects as markers. Be sure you try both the first and the second player's role. Don't proceed with this problem until you have played several games and developed a strategy for winning.

Write a program that will play the trapping game with a user. The program should make the computer the second player and the user the first player. The following output was printed from a sample program. Notice that the game played is identical to the one illustrated in the preceding diagrams. The circled numbers represent the moves entered by the user.

RUN

YOU SHOULD READ THE GAME RULES BEFORE STARTING

YOU MOVE FROM 1 TO ? 3  
I MOVE FROM 5 TO 4

YOU MOVE FROM 3 TO ? 1  
I MOVE FROM 7 TO 5

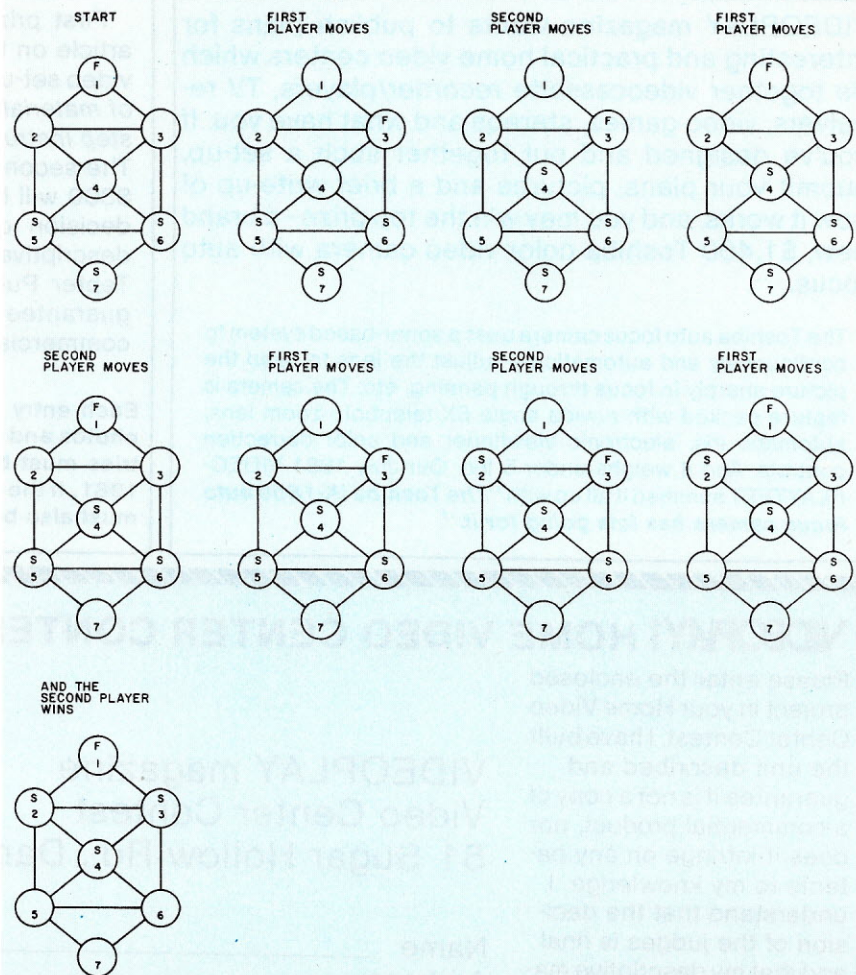


Fig. 5.

YOU MOVE FROM 1 TO ? 3  
I MOVE FROM 5 TO 4. AND YOU'RE IN TROUBLE!

YOU MUST MOVE FROM 3 TO 1  
AND I WIN BY MOVING FROM 6 TO 3

When you write your program, try to incorporate any knowledge you gained while playing the game. If you can write an unbeatable program, do it. If you write a program that can only be beaten in one way, that's almost as good.

After you've written a program that plays the game well, you might try adding graphics, which would make the program much more interesting for the user.

5. Our final problem comes from elementary school arithmetic. Expressing fractions in lowest terms is a habit you should have developed a long time ago. You can, for example, write  $16/64$  as  $1/4$  and  $49/98$  as  $1/2$ . Since you're already familiar with the correct procedure for expressing fractions in lowest terms, let's now consider an incorrect procedure.

The fraction  $16/64$  might be reduced to  $1/4$  by just deleting the 6s from numerator and denominator.  $16/64 = 1/4$ . Similarly,  $49/98 = 4/8 = 1/2$  might be reduced by deleting the 9's from numerator and denominator. Have we discovered a new



technique? Given a fraction of the form  $AB/BC$ , where A, B and C can be any of the digits 1 through 9, does  $A/C$  always represent a reduced form of that fraction? Unfortunately the answer to both questions is no. Our new procedure, let's call it "careless cancellation," is not generally valid. Nevertheless, you will find the following problems of interest.

A. For which values of A, B and C does  $AB/BC = A/C$ ? The domain of A, B and C is the set of integers 1 through 9 with the additional restriction that no two values are equal.

B. For which values of A, B, C, D and E does  $ABC/BDE = AC/DE$ ? The domain of the five variables is the set of integers 1 through 9 with the additional restriction that no two values are equal.

If you've created or stumbled upon any problems especially appropriate for students with access to computers, please let me know. Next month's column will be similar, and an occasional future column might focus on reader-contributed problems if that appears to be of interest.

As you tackle these problems or suggest them to a student, remember that the computer is only one of the tools to be used in obtaining a solution. As with many tools, it can support but not replace thinking. If you create a particularly clever solution, I'd like to see it. □

## MICRO QUIZ



### Analysis of Algorithms

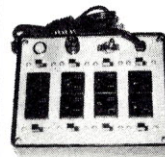
What sequence of numbers is output when the following program is executed?

```
DATA 5, 3, 4, 2, 1
FOR I = 1 TO 5
  READ A(I)
NEXT I
DATA 3, 5, 2, 4, 1
FOR J = 1 TO 5
  READ R(J)
NEXT J
FOR K = 1 TO 5
  PRINT R(A(K))
NEXT K
```

Answer on page 222.

## SPIKE-SPIKERS™

Protect-Control-Organize  
Computer & Peripheral Equipment  
Helps prevent software "Glitches"  
and unexplained memory loss



Deluxe Power Console  
**79.95**

Also available in 2-socket wall mounted models.

**PROTECTS** against power line transients & filters out RFI "Hash"

**CONTROLS** with 8 individually switched 120 vac grounded outlets, 2 separate filtered circuits.

**ORGANIZE** your computer & peripheral equipment power cords individually or main on/off switch-fuse & indicator light.



**MINI-I**  
Transient absorber  
**34.95**

**MINI-II**  
Transient absorber  
plus RFI "Hash" filtering  
**44.95**

Order Factory Direct  
**215-865-0006**  
Out of state call toll free  
**800-523-9685**



**KALGO Electronics Co. Inc.** ✓ 222  
Colony Drive Ind. Park  
6584 Ruch Rd., Dept. M C  
Bethlehem, PA 18017

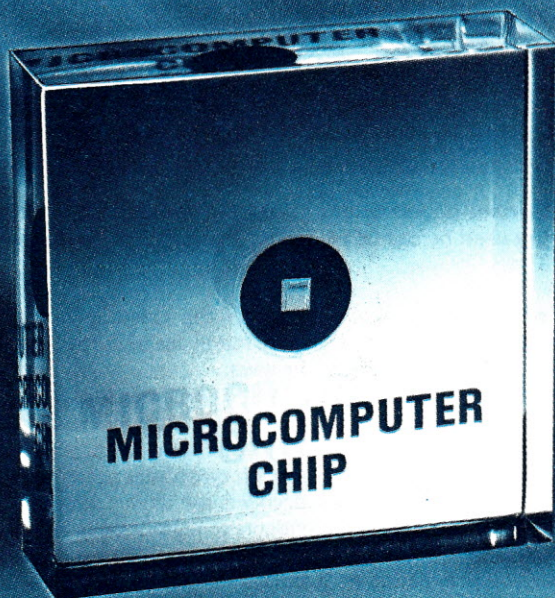


Dealers Invited  
PA Res. add 6%

# the ultimate computer accessory

Your own MICROCOMPUTER CHIP!

An authentic microprocessor suspended in clear lucite.



ACTUAL SIZE

COMPUTER MARKETING SERVICES, INC.  
300 West Marlton Pike  
Cherry Hill, N.J. 08002 ✓ 331

Please send me:

\_\_\_\_\_ MICROCOMPUTER CHIP

@ \$9.50\* each for a total of \$\_\_\_\_\_

\*N.J. residents add 5% sales tax.

I prefer to pay by:

☐ CHECK ☐ MASTERCARD ☐ VISA

Acct. No. \_\_\_\_\_

Expires \_\_\_\_\_

Signature \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State, Zip \_\_\_\_\_



# A Sound Idea For the Library

## Audio Reinforces Learning

### Audiotex—a Sound Idea

The Online Computer Library Center has come up with a novel use for the telephone.

Audio transmission.

That's right. If the Columbus-based computer service and research organization has its way, you'll soon be able to pick up your phone and get sound.

In fact, with a few modifications, you might be able to carry on two-way conversations. With another person, even.

The OCLC's idea isn't as absurd as it may first seem. The audio transmission they're talking about would be combined with existing data transmission technology to provide what the library calls an audio-enhanced videotext system. It would let users of viewdata services—which transmit data over telephone lines through a modem and onto your television screen—retrieve both text and sound from the host database.

For example, an encyclopedia entry on the double-breasted sapsucker would be accompanied by that bird's sound. Or a biography of John F. Kennedy could include a recording of his inaugural speech.

The OCLC has given such a service the name of audiotex, and calls its particular brand of audiotex ViewTel. The hardware used with ViewTel is pretty much standard, with the exception of a slightly modified decoder at the receiving end and an Instavox RA-12 rapid access audio unit at the host system.

The Instavox unit, from Education and Information Systems, Inc., in Champaign, IL, operates much like a floppy-disk system used for data storage, only the disk is 15 inches in diameter. It stores 27 to 44 minutes of audio, depending on the kind of audio required.

The OCLC method is the least-expen-



*The Instavox RA-12 rapid access audio unit, from Education and Information Systems, Inc., is being used by the OCLC as part of their audiotex system.*

sive and simplest of several ways to transmit audio and data over the same line. As a result, ViewTel sacrifices simultaneity—the user cannot receive sound and text at the same time. He must therefore switch into an audio mode, and receive the recording while the text is frozen on the screen.

Mark Bendig, an OCLC research associate, says that the ViewTel project emerged from a recent OCLC videotext experiment called Channel 2000 (see *Micro-Scope*, October 1981, p. 28), which was a conventional text-only viewdata service.

"What impressed us was the fact that

none of the existing videotext services have made use of the audio capabilities," he says.

Audio transmission, he says, has several other possible uses besides enhanced textual material. For instance, a speech synthesizer could be placed in the decoder, the device which translates the videotext signal from the telephone to the television. This synthesizer could have a fixed vocabulary, or could generate phonemes to create words. Voice messages, special codes and the like could be controlled either locally or by the remote computer.



But, says Bendig, the largest application—"and perhaps the most exalted of all"—is two-way audiotex. Here, the user could actually talk with a microphone to a mediator at the host system. The user would describe what information he was looking for, and the mediator would connect the customer to the computer's appropriate database.

At first glance, this may seem like a step backward. Videotext services presumably eliminate human intermediaries, and put the consumer in direct contact with the computer. But Bendig points out that database users traditionally have fairly sophisticated skills, skills which the average consumer generally doesn't have.

"We take a sophisticated service and hand it to a naive user at home," he says. "We impose a rigid kind of access constraint—the menu tree. This is okay for a limited number of sources, but you run into a problem with a vast database. Can you imagine using a menu tree to sift through the contents of an entire database?"

"So what we propose to do is in effect take the existing kind of videotext system and replace part of it with humans. It has a human being explicitly as part of the system to make meaningful to the average user the idea of using a computer."

Bendig says that the decoder will be able to answer the telephone and record a message. Thus, a librarian, for example, could take a request for information and respond while the user is not around.

Bendig acknowledges that ViewTel has several potential problems. First, the audio portion of an audio-enhanced database would have to be developed from scratch. "You would have to make your own; there aren't any yet," he says.

Second, the quality of the sound could be less than optimal. The signal has to go through the telephone lines, the decoder, the modulator, the TV circuitry and the amplifier before it even reaches the speaker. And, as Bendig points out, television speakers are not designed for high-fidelity sound.

"But voice transmission will come out okay," he says. "I suspect it will be better than you get in a normal phone conversation."

The OCLC has prepared a prototype of the system, using a North Star microcomputer as the host. Bendig says that the Center has no plans to start up a ViewTel service of its own, but hopes instead to provide it to other videotext services. And he thinks that the interest will be there.

"One sound is worth 32 by 16 characters," he concludes.

—Eric Maloney

## An Apple a Day . . .

It is an accepted fact that doctors no longer make house calls, probably because they don't need to. But they sure

do make telephone calls.

Take, for example, the doctors in residence at the Ventura, CA, General Hospital. They sometimes make as many as 200 calls a day from the hospital to the neighboring clinic. Even Alexander G. Bell would have cringed at the sight of the jammed switchboard and harried medical secretaries trying to untangle the confusion. Enter the Apple II computer.

The 32 doctors in residence at General Hospital have a variety of patients in the hospital, and others who make regular visits to the out-patient clinic. Each doctor is required to make his rounds and be on call during certain hours of the day in the hospital. In addition, each doctor may see several patients in the clinic during the course of a day. It is something of a problem for a busy physician to remember the schedules for his clinic and hospital activities.

Hence, the clinic, in the pre-Apple era, was often deluged with telephone calls from doctors wondering about their out-patient schedule. It also was difficult for the clinic staff to update the residents on patient cancellations, no-shows and late arrivals.

General Hospital is a modern, well-equipped facility using an in-house closed-circuit television system to display information for staff and visitors. This system was ideal for the display of the out-patient schedules that could keep doctors posted on happenings in the clinic. The hospital technical staff decided that a microcomputer would be the ideal storage device for this information. The hookup to the existing closed-circuit system would be a simple interface.

The hospital selected an Apple computer because of its low cost and flexibility. The software for the system was designed to permit a display of the out-patient schedule at least an hour in advance. The display was designed to allow the doctor to tell at a glance when a patient was scheduled, and when the patient arrived. This eliminated dozens of phone calls between the hospital and clinic.

The system provided additional benefits as well. Because they were no longer fielding so many telephone calls, the nurses in the family care center were freed up to perform their regular duties. This resulted in greater efficiency in clinic operations. The residents used their time more efficiently as well, budgeting their hospital hours more carefully, secure in the knowledge that there was no doubt as to their next clinic appointment. The overall increase in staff efficiency was eventually reflected in an increased patient flow.

The telephone calls between the hospital and the clinic were the most tangible measure of the viability of the system. These calls were monitored for four weeks prior to the installation of the system and for four weeks after its installation. The reduction in calls was dramatic—from 536 to 324, a 40 percent drop. In

subsequent weeks, as the staff became more comfortable with the system, the calls decreased still further. A survey of the staff showed overwhelming approval of the system.

The information necessary to run the clinic is still the same as it was before. Communication is still vital to the smooth operation of the clinic. The difference the microcomputer made was simple, but elemental—it got things organized.

G. Michael Vose  
Microcomputing staff

## Apples on the Reservation

Dr. Clayton Curtis is a former electrical engineer who used to be a mainframe systems programmer. He gave up programming for medicine because he wanted to help people. So what is he doing now for the U.S. Bureau of Indian Affairs Health Service?

"I'm working out of the Office of Research and Development for Health Information Services as a programmer," says Curtis from his office in Tucson, AZ. "One of the projects I'm working on is the development of a database of patient information at our central offices which can be accessed by individual doctors at their clinics using Apple microcomputers, modems and regular telephone lines."

The Indian Health Service in the Southwest comprises several clinics, each with two to four doctors, a nursing staff, pharmacy and rudimentary lab facilities. Each of these clinics serves a particular clientele, but all need to access the records kept on patients by the Service's headquarters. In addition, doctors are frequently required to obtain clinical as well as patient information from the central offices.

Curtis, through a long association with computer technology, is anxious to help his colleagues exploit the potential of the microcomputer. "Microcomputers are useful because they can allow the doctor to control the input of information into the overall database. Doctors are notoriously impatient with their client information systems, whether they happen to be file cabinets full of patient folders or computers. With a microcomputer, the doctor can feel like he is more in control of the information input and retrieval process."

Curtis and his team are trying to develop a system to track a patient's problem list, medications, the clinical details of the problem management strategy, standard diagnostic checks, visit planning and other details. Some Indian tribes are plagued by specific classes of health problems, apparently due to heredity.

For example, Curtis says, "The Papago Tribe has a history of a high incidence of diabetes and gall bladder trouble but little heart disease. The Navajos have a lot of heart disease, related to streptococcus infection, but little diabetes. Treatment strategies for a particular patient or a familial group can be tracked by comput-



er so that the physician can quickly determine what treatments have worked before and which have not."

Curtis asserts that micros today are at the level that minicomputers were at 15 years ago. "The small size and low cost of a microcomputer makes the building of a system such as the one we are working on feasible. Microcomputers that can support high-resolution graphics, voice input, touch-sensitive CRT screens and other innovations will broaden the scope of the applications for these machines in the medical field."

Curtis and his staff are using the MUMPS language in their development system. MUMPS only recently became available for the Apple computers used by the Indian Health Service, but Curtis feels that, for clinical applications, it is an excellent language.

"Some of the things that are complicated to do in BASIC or Pascal are easy to do in MUMPS," he says.

Questions on the systems being developed by Curtis and the Indian Health Service can be addressed to Curtis in care of PO Box 11340, Tucson, AZ 85734.

**G. Michael Vose**  
*Microcomputing staff*

## Net for Special Education

Special education administrators now have their own communications and information network.

The net, called SpecialNet, is sponsored by the National Association of State Directors of Special Education. It offers an electronic mail service and several bulletin boards, for administrators who need to quickly access up-to-date information on special education topics.

A key bulletin board, Litigation, offers information on laws regarding handicapped persons, and provides access to the Education for the Handicapped Law Review (EHLR) in Washington, DC.

Personnel Preparation and Training is a bulletin board devoted to new techniques in training special educators. It also reports important developments in ways to work with the handicapped.

The Federal bulletin board lists new federal laws that affect the handicapped, bills currently in Congress, and information regarding funding.

Other bulletin boards include computer applications, employment opportunities, a consultant resource bank, a conference schedule, new products, new publications, assistive devices, advocacy group information and editorials.

In keeping with SpecialNet's orientation toward rapid access to information, bulletin board entries are kept concise (under 40 lines).

Although the system has just started, it is "moving very rapidly," says spokesman Gary Snodgrass. "We'd like for it to be as broad as possible," he says, reaching across various disciplines such as

medicine, rehabilitation and education.

SpecialNet can be used by any ASCII-standard, asynchronous microcomputer. Subscriptions cost \$200 a year. Costs for access time vary according to the time of day the system is used: \$14 per hour from 7 AM to 6 PM, \$7 from 6 to 9 PM on weekends and holidays and \$4 from 9 PM to 7 AM.

**Lise Markus**  
*Microcomputing staff*

## The Source's Source

"If you thought The Source was all fun and games, wait till you see how it works for your business," reads a recent ad from Source Telecomputing Corp.

It's understandable that the McLean, VA, electronic information service is making a pitch to the business community. A recent survey of its subscribers shows that over 40 percent subscribe to The Source for business or work, while 50 percent say they will use The Source for business-related reasons during the next 12 months.

The survey, which included 48 percent of The Source's 10,000 subscribers, shows that the information service is attracting a decidedly well-educated and affluent clientele. The typical user is a 37.6-year-old male with a college degree or better, and makes \$39,000 a year.

The study shows that while 44 percent of The Source's subscribers a year ago belonged to computer clubs, only 27 percent do so today. Three times as many businessmen and managers are likely to use the service than engineers, scientists, professionals or people in computer-related jobs. Forty-two percent are businessmen or managers, 16 percent are engineers or scientists, 14 percent are in the computer field and 12 percent are professionals.

The most popular services among business professionals include research, electronic mail, business planning and forecasting, news and financial market monitoring, personal portfolio maintenance and home education.

"When computers were made easily accessible to the individual in the mid-1970s, persons employed in the computer field were the first to use them, and they treated them as a hobby," said STC Vice-President A. Martin Clark in a prepared statement. "Now we are seeing a rapid spread of practical interest in the benefits of electronic, computer-based services among business professionals."

## Medical Data on Line

An electronic information system for doctors is being developed by the American Medical Association and General Telephone and Electronics.

The system, due to go on-line sometime in mid-1982, will feature an encyclopedic database for use in patient diagnosis and

treatment. Doctors will access the database through GTE's Telenet communications system, with either a terminal or a microcomputer.

The exact nature of the information to be provided is not yet known, says AMA spokesman Tom Toftley. They're starting out with drug evaluation information, he says, primarily because the AMA recently published its fourth edition of the hard-copy version, and has the data readily available.

A spokesman from GTE says that the service will be initially marketed to hospitals and clinics. It will then be expanded to include private physicians.

Toftley says that the potential market includes 425,000 doctors, 7000 hospitals and 15,000 group practices.

The two organizations have not yet set a price for the service.

## Newspapers to Stay

While the electronic newspaper will play an increasing part in American life, more than 90 percent of newspaper subscribers will continue to buy the paper version of their newspaper, says a recent report from International Resource Development.

The report says that during the 80s, the market for electronic newspaper services will grow to more than \$500 million, divided evenly between consumer and business uses. But such services will be used by a relatively small portion of the population.

Electronic newspaper services are most likely to provide an enhancement to conventional newspapers, the study says. These services will most benefit those with microcomputers, videotext terminals or specially-adapted FM radios, and include:

- Demand updates, in which a terminal or microcomputer user can get detailed information on stories he or she finds in the paper;
- Broadcast updates, in which the terminal user receives information on topics he has indicated a special interest in; and
- Broadcast updates by FM sideband, in which the user receives news on previously-selected topics through his radio either verbally or on a terminal or printer.

The report says that such products will be most profitable to newspapers with established electronic newsrooms, in which the electronic newspaper is a by-product of an existing system. Newspaper companies will thus most likely dominate the electronic news business, although Ted Turner's Cable Network News or the Westinghouse news network could offer competition.

The report also says that electronic news will foster the development of "boutique" suppliers of news on specialized topics. These suppliers may focus on offbeat news stories, sports and particular hobbies. □



# STONE of Sisyphus

INCLUDES 2 JAM PACKED DISKS OF DATA BUT  
WILL WORK ON YOUR 1 DRIVE MICROCOMPUTER!

AVAILABLE ON DISK ONLY FOR:

TRS-80 MODEL 1 32K	012-0100	\$29.95
TRS-80 MODEL 3 48K	012-0100	\$29.95
Apple 2, Applesoft in ROM	042-0100	\$29.95
ATARI 40K	052-0100	\$34.95

 **Adventure**  
INTERNATIONAL

A DIVISION OF SCOTT ADAMS, INC.  
BOX 3435, LONGWOOD, FL 32750  
(305) 862-6917

ORDER FROM YOUR FAVORITE DEALER  
or CALL TOLL FREE (800) 327-7172

SHIPPING & HANDLING ARE EXTRA. PRICES SUBJECT TO CHANGE WITHOUT NOTICE

We want to take you on a journey — a journey into an age undreamed of. When a man's worth was measured by his courage and his cunning. With **STONE OF SISYPHUS**, we have re-created the wonderment of that ancient era. The Maces & Magic Series allows you to interact with the adventure on an intensely personal level. You create your own character, giving him (or her) the attributes of strength, IQ, constitution, dexterity and charisma. You then arm and prepare your creation for the challenges ahead. Amazingly, your character will evolve and grow as the journey progresses. Prepare yourself — breathe deeply, and step into the enchantment of **STONE OF SISYPHUS** and the Maces & Magic Series.

ART COPYRIGHT  
1981 RAYMOND BAYLESS



# Micro Monikers

# A Micro By Any Other Name...

"What is a 'personal computer'?" William Safire asks in a recent *New York Times* column. "Presumably it means that one person can work it, but can't one person work any computer?"

Safire is a little bit off the mark. In the micro world, a "personal" computer is one that can be used *exclusively* by one person (as opposed to a timesharing system, which can be used by one person but is also used by many others), and one whose applications are usually personal (personal finance, home security and the like). It also implies a certain size, cost and ease of use.

But the point is well-taken—the term "personal computer" has its problems.

First, it smacks of Madison Avenue hucksterism. Everything today is personal, from cars to hygiene sprays. If a product isn't personal, it's at least personalized—for example, bath towels, keychains, horoscopes and coffee mugs. A personal computer sounds like something you'd get for \$2.95 and a dozen Wheaties box tops.

Second, the term connotes fun, games and frivolity. It conjures up images of Mom, Dad, Buddy, Sis and Spot in the living room playing Space Scum, or Mom in the kitchen cheerfully retrieving a recipe for steamed hot dogs, or (at best) Dad trying to figure out how to avoid having his car reclaimed. A personal computer is not much more than an expensive toy, and certainly not something that a serious businessman would be attracted to.

The term home computer suffers from many of the same problems. Again, it's a device that belongs in the home next to the stereo and the pong game, not in the office, school or laboratory.

So what do we call these things? What name gives an accurate picture of what they can do, both in the home and in business or school?

Microcomputer is the broadest of the generic terms being used. It lumps together a wide variety of machines, which vary in power but are similar in price and size. But microcomputer is an ill-advised marketing term—it has a technical aura that places it in the serious computer or

science lab. As Jim Edlin points out in *InfoWorld*, "It still says, plain as day, 'this product is some kind of a computer.' And right now, like it or lump it, the general public is indifferent or hostile to the idea of having computers."

That leaves us with the term desktop. While it accurately describes the average micro/home/personal computer, it perhaps suffers from being identified too strongly with business. Also, as micros become more portable, and as they begin appearing in environments in which desks don't even exist (cars and bus terminals, for example), the term will lose some of its accuracy.

Perhaps the market is too diverse to settle for one term. As microcomputer manufacturers shape their marketing strategies, they're each beginning to focus on a more specific group of consumers. It's possible that, while all are selling microcomputers, some will sell home computers while others will sell desktop computers, just as automobile manufacturers sell luxury, family and compact cars.

One thing's for certain—we've come a long way since the days of the first mainframes. How'd you like to go into your local Radio Shack and ask to see their latest Electronic Numerical Integrator and Computer?

\* \* \* \* \*

The IBM Personal Computer raised some questions here about the use of the letter K to indicate kilobytes of memory, as in 16K RAM. The problem is that K means one thousand, and thus can mean either one thousand bytes or 1000 words.

This is fine when describing a machine with an eight-bit microprocessor. One word—the number of bits capable of being stored in one location—is eight bits, which happens to be what a byte is. Thus, a byte and a word are the same.

But in a 16-bit microprocessor, such as IBM's, a word is equal to 16 bits. Thus, there are *two* bytes to each word. In such a case, 8K RAM could mean 8K bytes (4K words) or 8K words (16K bytes).

So we've started to use K byte instead of K alone. We hope that this will anticipate

potential reader confusion. Microcomputers can be confusing enough as it is.

\* \* \* \* \*

Another objection to my objection to the word keyboard as a verb, this one from *Northwest Computer News* editor Bob Woodbury (whose excellent article "Beyond Gutenberg" appeared in our May 1981 word processing issue):

"In word processing, creating a file involves a lot of typing (continuous entry of words), but also a lot of inserting, deleting, retrieving, entering and other things not possible on a typewriter. 'Type,' as a verb, does not describe this activity. This verb should only be used to describe a particular phase of word processing. After all, why do we have word processors rather than electronic typewriters?"

"Word processors promote a new way of thinking about the process of getting thoughts into print. New words will be required, or the meanings of old words will change. Maybe 'keyboard' will become an accepted verb. It is already a part of the technical jargon, and jargon often ends up in common use. Maybe 'type' will take on a new meaning which includes all the activities of word processing.

"Language purists get stomach trouble when they see or hear nouns used as verbs or vice versa unless this use has been sanctioned by time. I think an evolving language will see a lot of this, and that it is good if the new use does not obscure meaning. The use of 'keyboard' as a verb is clear in meaning."

Well-said. I'll concede that the word keyboard has entered the language as a functional verb (function is, I think, more important than time to the sanctioning of a word). And I'll agree that there is a lot of activity on a computer keyboard not accurately described by the verb type (although a typewriter has similar activity, such as back spacing, setting and clearing tabs, shift-locking and carriage returning, which are covered by the verb type).

But much of the time writers use the word keyboard to describe the entering of straight text. So why not use type? It's shorter, cleaner, and more familiar to noncomputerists. □



# TEST YOUR WINGS

## FLIGHT PATH

**O'Hare**—A control tower simulation in which you become an Air Traffic Controller. You are responsible for hundreds of human lives, as you guide aircraft through your control sector to a safe landing.

You'll have to deal with different aircraft requirements, wind change warnings and potential mid-air collisions.

**Mountain Pilot**—Transforms you into a daring bush pilot as you fly badly needed supplies to a remote gold mining camp. You must cross a hazardous mountain range, while struggling with headwinds, tricky navigation and diminishing fuel.

**Precision Approach Radar**—Combines the skills of pilot and Air Traffic Controller.

The Flight Path package involves you in both sides of flight procedure, from the thrill of flying to the tense drama of air traffic control.

TRS-80 Model I, Level II, 16K RAM; Model III, 16K.

Order No. 0171R-A55 Tape \$9.95 plus \$2.50 shipping.

## NIGHT FLIGHT

It's May, 1941, the dreaded Axis battleship, the Bismarck, has broken out of the North Sea and is now somewhere in the North Atlantic. Your mission: make a nighttime photo reconnaissance fight over the Bismarck.

Somewhere out in the cold, gray North Atlantic, the Bismarck tries to elude her pursuers. Your photos are vital. Launch yourself into the night sky with the Night Flight package.

TRS-80 Model I, Level II, 16K; Model III, 16K.

Order No. 0117R-A56 Tape \$9.95 plus \$2.50 shipping.

## JET FIGHTER PILOT

The Jet Fighter Pilot package takes you as close to real combat flying as possible... without pulling G's.

In this brilliantly realistic simulation, you become the pilot of a high performance, twin turbo-jet fighter. Total control of the aircraft is yours.

All controls respond the same as they would on a real jet fighter. You'll have to constantly monitor your display and make adjustments to your throttle, flaps, rudder and air spoilers. You decide when to retract flaps, landing gear and release the auxiliary fuel drop-tanks.

After you've flown a few missions with the Jet Fighter package, you'll know you've earned your wings. TRS-80 Model I, Level II, 16K; Model III, 16K.

Order No. 0159R-A53 Tape \$14.95 plus \$2.50 shipping.

Icarus had the right idea. He, and probably every man since the beginning of time, wanted to fly. He had the right idea, but the wrong equipment. With Instant Software's Flight Simulation Series and your TRS-80, you're equipped to fly the World War II reconnaissance missions, perform the feats of a daring mountain bush pilot and experience first hand the tense atmosphere of an air traffic control tower.

Find out what Icarus had to learn the hard way... and master it, with Instant Software's Flight Series.

## AIR FLIGHT SIMULATION

Air Flight Simulation might be more like it! Instrument takeoffs and landings are no picnic—ask any pilot—and this computer simulation is certain to keep you on the edge of your seat.

You begin with a full tank of gas and a flight plan that calls for a simple takeoff and landing—at least until you get the hang of it. Pay close attention to your instrument panel, especially the angle of ascent/bank indicator and air speed indicator—too steep a bank and your air speed will drop like a stone... and so will your plane.

It's about as close to the real thing as you can get this side of a runway. TRS-80 Model I, Level II, 16K; Model III.

Order No. 0017R-A54 Tape \$9.95 plus \$2.50 shipping.

\*TRS-80 is a trademark of Radio Shack a division of Tandy Corporation

# Instant Software™

Peterborough, N.H. 03458 USA

A division of Wayne Green Inc.

## TO ORDER:

See your local Instant Software dealer  
or call toll-free 1-800-258-5473

orders only

In New Hampshire 1-603-924-7296

Mon.-Fri. 8:00 am - 4:30 pm E.S.T.





# LETTERS TO THE EDITOR

## Five Volt Only

We oldtimers in electronics recognize the  $\pm 5$  volt power supply designation as meaning a positive and a negative power supply, or a total potential difference of 10 volts.

I have used the 6845 mentioned in Joe Martinka's "Videographic" article (Aug. 1981, p. 60), and this chip is a "five volt only" integrated circuit. This minor error will not bother the experienced builder one bit but it may make things more difficult than necessary for the newcomer.

**George Young**  
Tollhouse, CA

## Lowercase Mod

The April 1980 issue of *Microcomputing* ("Lowercase for the TRS-80," Steven Wexler, p. 132) has a lowercase mod for the Model I. I think this is a great mod and I have been using it since the article appeared and have not had any problems with it. NEWDOS 80's LCDVR works fine with it and so do all the other drivers I have used. That is, until I recently purchased DOSPLUS 3.3D. Its automatic lowercase mod detector does not recognize this mod. So I dug into the code and offer this patch to anyone who may have the same problem: Execute the system's Diskzap program. Display Track F, Sector C. Then find on the fifth line the code 2806. Enter the modify mode and zero these two bytes. That's all. Boot the system and you should have lowercase. This patch effectively bypasses the detector and enables the lowercase driver regardless of the hardware.

**Truman Krumholz**  
Springfield, MO

## Less Traumatic for Your Apple

The article in the August 1981 issue of *Microcomputing*, "Apple to Selectric for 83 Cents," looks like a good way to beat the high cost of interface boards.

I found a much less traumatic way to hook everything up. Get a 16-pin DIP socket with long leads such as a wire-wrap type. Trim them about 1/16-inch longer than the leads on your paddle. Next, tack solder small-gauge wire (such as wire-wrap wire) to pins 9 and 16 of the socket. Make neat solder connections very close to the socket base leaving most of the leads free of solder. Make sure there are no shorts. The pins should be straight and filed smooth on the ends. Plug this socket into the game paddle socket. If you have any peripheral cards (I used my

disk card in slot 6), the rest is easy. Carefully count the pin slots and trace the printed circuit lands that connect to pins 33 and 50 of the slot connector. At the first solder blob of each land, connect the wires—33 to paddle pin 9, 50 to paddle pin 16. Now you can build and plug in the interface circuit as shown in the article. (I believe the required transistor is npn, not pnp as drawn in the schematic.)

If you have no cards, perhaps you can make a dummy card out of instant stick pc foil and the right sized piece of perf board—or etch you own pc board.

This is a fast method that makes no permanent changes in your Apple. I haven't gotten a Selectric yet, but if I do you can bet I will try this.

**Dorrance Rigney**  
Chelan, WA

## In Defense of the IEEE-488 Bus

Mr. Briggs' comments (August 1981) on the appropriateness of the IEEE-488 bus for low-cost microcomputer hardware are somewhat off base. The following manufacturers support the IEEE-488 bus for microcomputers:

- Commodore—computers, disk drives, printers, modems
- SSM—Apple to IEEE-488 interfaces
- California Computer Systems—ditto
- D & W Digital—S-100 to IEEE-488 interface
- Scientific Engineering Laboratories—TRS-80 to IEEE-488 interface
- Base Two—printers (with RS-232, Centronics, and IEEE-488 interfaces included, not optional)

There are many other manufacturers of devices which support this bus, including Hewlett-Packard (manufacturer of the system Mr. Briggs says is more attractive than the Osborne), Wang, Tektronix, Livermore Data, Fluke and Racal.

While not the most popular communications protocol, the IEEE-488 bus does have broad-based support. The bus supports intelligent devices, spooling (peripheral to peripheral communications without central processor intervention), and multiple devices (up to 15) on a single I/O port. As the computing power of peripheral devices increases, the value of the IEEE-488 bus becomes more apparent; and it is available for the three most popular microcomputer systems in the U.S. at very little cost (in the case of Commodore computers at no extra cost).

**P. J. Rovero**  
San Francisco, CA

I appreciated Mr. Briggs' comments (Letters to the Editor, August 1981) on both Mr. Osborne and the Osborne I, but I must take exception to his comments on the IEEE-488 (GP-IB). Although true that

the de facto standard for printer interface has been the Centronics parallel, Mr. Osborne should receive a plus on his score sheet for including the GP-IB in his design. Mr. Briggs is certainly correct in stating that the GP-IB initially got its start through industrial use in instrument control/measurement systems. However, the GP-IB has become a *standard* for peripheral interface (printers, plotters, floppy, hard disk, 9-track tape) with the giants such as HP, Tek and Fluke. DEC and Data General also have GP-IB interfaces for their mainframes. Yes, even Epson and (soon) Zenith offer IEEE-488 interfaces. There are several S-100 to GP-IB cards available (some not very good). In fact, N.H. Research (Irvine, CA) manufactures a dual GP-IB on a single card and has added four dozen verbs to Microsoft BASIC for their product (unfortunately this card is not available without purchasing their system). Cost of the IEEE-488 is set by the marketplace and not necessarily by hardware design. The RS-232 interface is more costly than the GP-IB for the Epson printer and yet the design of the GP-IB is more complicated.

Mr. Briggs needs to reevaluate the GP-IB interface because computers that don't offer GP-IB in the future will suffer in terms of sales.

**Robert H. Stratton**  
Advanced Digital Group Inc.  
Garden Grove, CA

## The STD Bus Debate

Mr. Langford's article on the STD bus ("The STD Bus is Coming," August 1981, p. 226) is generally accurate. There are, however, over 50 manufacturers of STD products and CPU support that include the 8088. The marketplace is very clearly defined as process/control catering to the OEM and not the hobbyist. The target is Intel and the STD is a cost effective alternative to their large boards. The STD will not replace the S-100 (now that there is some standardization) simply because there is a marketplace for the larger sized cards. This marketplace, however, is shifting to the professional side rather than the hobbyist.

I'm very disappointed that one of the major manufacturers, and the *original* designer/user of the STD, was left off the company list. That company is: Pro-Log Corp., 2411 Garden Road, Monterey, CA 93940 (408-372-4593).

**Robert H. Stratton**  
Advanced Digital Group Inc.  
Garden Grove, CA

(continued on page 211)



## AT LAST!

Mass production prices for high quality software. Buy direct and save 50%. Also available for CPM and HDOS.

**DATA BASE MANAGER** Mod-I & III \$69, \$149 (48K). Mod-II \$199  
Maintain a data base and produce reports, all without user programming. Define file parameters and report formats on-line. Key random access, fast multi-key sort, field arithmetics, audit log, label. No time-consuming overlays. 500 happy users in one year. Mod-II and 48K versions have over 50 enhancements, including 40 fields maximum. "IDM-M2 is great!" - 80-US.

**A/R** Mod-I \$69 Mod-II \$149 Mod-III \$69  
Handles invoices, statements, aging, sales analysis, credit checking, forms input, and order entry. Unlike other accounts receivable programs, ours can be used by doctors, store managers, etc.

**WORD PROCESSOR** \$49  
Centers, justifies, indents, and numbers pages. Mod-I version features upper/lower case without hardware modification! File merge option available.

**MAILING LIST** Mod-I & III \$59, \$79 (48K). Mod-II \$99  
The best! Compare and be selective. Includes forms input, 5-digit selection code, zip code extension, sort on any field, and multiple labels. Who else offers a report writer and merges with word processor?

**INVENTORY** Mod-I & III \$89, \$109 (48K) Mod-II \$149  
Fast key random access. Reports include order info, performance summary, EOQ and user-specified reports. Many people have converted to our system! "Next to impossible to damage the file."

**GL. A/R. A/P. PAYROLL** Mod-II \$129 each  
Integrated accounting package. 100+ page manual. As opposed to Osborne's slow binary search and 64 column screen, we use fast ISAM and 80 columns. Dual disk and TRSDOS required.

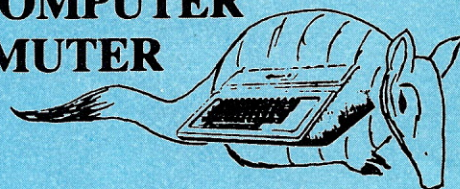
**L216** \$59  
A cassette package of 10 business programs for Level II 16 K systems. Includes word processor and data base manager. Poker game \$19.

Most programs are on-line, interactive, random-access, bug-free, documented, and delivered on disks. Mod-I programs require 32K TRSDOS. We're #1 in business software—don't let our low price fool you! Ask for our free 20-page catalog if you're still not convinced. Compiled versions are available.



**MICRO ARCHITECT, INC.**  
96 Dothan St., Arlington, MA 02174 ✓ 108

## ARMADILLO COMPUTER COMMUTER



### Unheard of Discounts on all Micro-Computer Equipment and Software

#### Including:

- Apple
- TRS-80
- Commodore/Pet
- Atari
- Zenith
- Corvus
- Cameo
- Anadex
- C-Itoh
- Epson

*All equipment includes  
full factory warranties.*

## dBASE II—\$595<sup>00</sup> FREE BOX OF DISKETTES WITH EVERY ORDER 30 DAY MONEY-BACK GUARANTEE

With dBASE II you can extend the power of your microcomputer to jobs that were previously reserved for the larger mainframes. Here's a partial list of applications that dBASE II has been used for:

- General Ledger
- Journal of Accounts
- Accounts Receivable
- Accounts Payable
- Sales Tax Records
- Payroll
- Check Management and Writing
- Time Billing
- Inventory Control
- Job Costing
- Tax Computation
- Document Cross Referencing
- Legal Office Accounting
- Scheduling
- Mailing Labels
- Calendar Events

If your application calls for managing data, dBASE II may be the answer.

You can create a database and start entering data into it in less than a minute.

Type CREATE, then respond to the dBASE II prompts to name the file and define the fields in your records.

Once the record is defined, you can start entering data immediately, or add information later by typing APPEND. In both cases, dBASE presents you with an entire record structure for which you simply fill in some or all of the blanks.

Now, for a limited time only, you can purchase the most powerful DBMS system for your micro for the incredibly low price of \$595 delivered. We'll send you a copy of dBASE II, that you can run on your system, for 30 days. If you're not completely satisfied, then just send everything back and we'll return your money, no questions asked! Even if you go for another system, you'll be an informed buyer!! (dBASE II is a fine product by Ashton-Tate)

**STANDARD SOFTWARE  
CORPORATION OF AMERICA** ✓ 217  
10 MAZZEO DRIVE, RANDOLPH, MA 02366  
CALL (617) 963-7220

LARGEST SELECTION  
OF CPM SOFTWARE  
IN THE U.S.A.

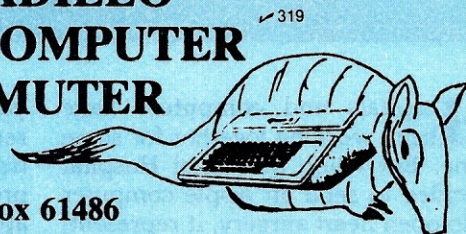


MASTERCARD  
AND  
VISA ACCEPTED

Try these **Hard Shelled** prices on for size:

Apple II + 48k	1190.00
Atari 800 16k	775.00
Commodore Vic 20	259.00
TRS-80 III 48k 2 Dr.	2195.00
Anadex 9501	1325.00
C-Itoh Comet	425.00

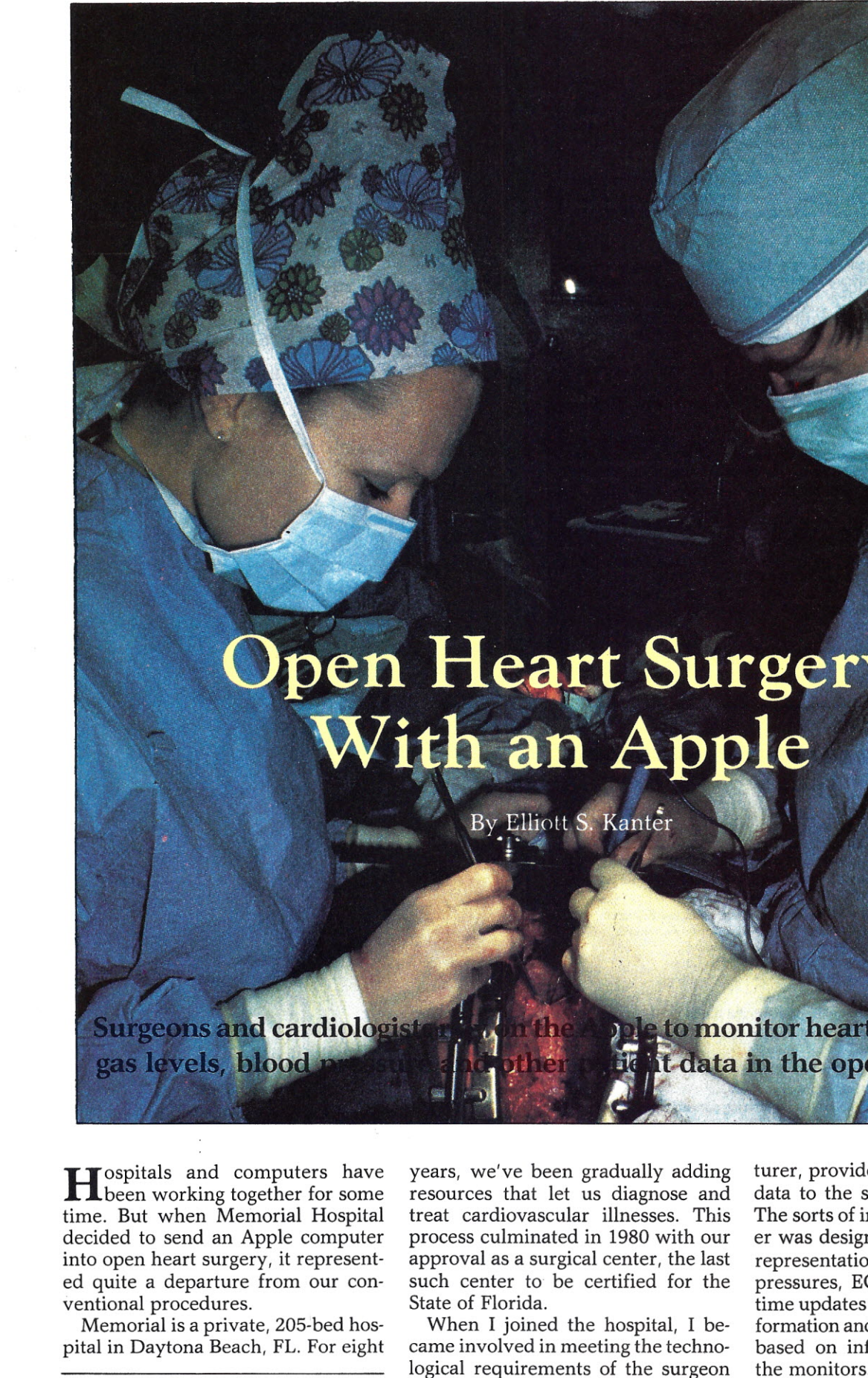
## ARMADILLO COMPUTER COMMUTER



**P.O. Box 61486  
DFW Airport, TX 75261**

**Ordering Line  
Call 214-254-5511—Dept. Alice**





# Open Heart Surgery With an Apple

By Elliott S. Kanter

Surgeons and cardiologists use the Apple to monitor heart action, blood gas levels, blood pressure, and other patient data in the operating room.

**H**ospitals and computers have been working together for some time. But when Memorial Hospital decided to send an Apple computer into open heart surgery, it represented quite a departure from our conventional procedures.

Memorial is a private, 205-bed hospital in Daytona Beach, FL. For eight

years, we've been gradually adding resources that let us diagnose and treat cardiovascular illnesses. This process culminated in 1980 with our approval as a surgical center, the last such center to be certified for the State of Florida.

When I joined the hospital, I became involved in meeting the technological requirements of the surgeon and the cardiologist. Our equipment included a dedicated computer system which, according to its manufac-

turer, provided a variety of real-time data to the surgeon during surgery. The sorts of information this computer was designed to provide included representations of waveforms (blood pressures, ECG [heart action]), real-time updates of vital blood gas test information and a variety of calculations based on information furnished by the monitors.

The system took data from several sources as diagrammed in Fig. 1, processed it and displayed it on two large

---

*Elliott S. Kanter is the director of biomedical engineering at Memorial Hospital, 875 Sterthaus Ave., Ormond Beach, FL 32074.*

---



CRT displays in the operating room.

Some of the data was immediately and locally obtained from analog and digital outputs to the monitors. But other information was entered by a technician. For example, blood samples were drawn, sent to the remote (some 170 feet distant) cardiopulmonary lab and processed by a computer-enhanced analyzer; the results were then typed into the computer system for display in the operating room. Both locations were able to communicate on a minimum level through the computer via two separate keyboards.

Medical applications of electronics are just like any other: if something can go wrong, it will. In our case, we rapidly learned that our \$30,000 computer system was not capable of doing either what the surgeon required or what the manufacturer had promised.

Our problems were further complicated by irregularities in our power supply. Floridians have a nickname for the power company that has to do with the words flicker and flash. The open-heart computer couldn't tolerate these brief episodic flickers, and frequently crashed. Although at no time was a patient's welfare jeopardized, we decided that the system was not reliable enough. We determined to either improve or replace the existing computer system with something that was simple to use, reliable under power fluctuations, cost-effective and able to do other tasks.

### Choosing a Micro

We examined our present system, and decided that the channel of information between the cardiopulmonary laboratory and the operating room—

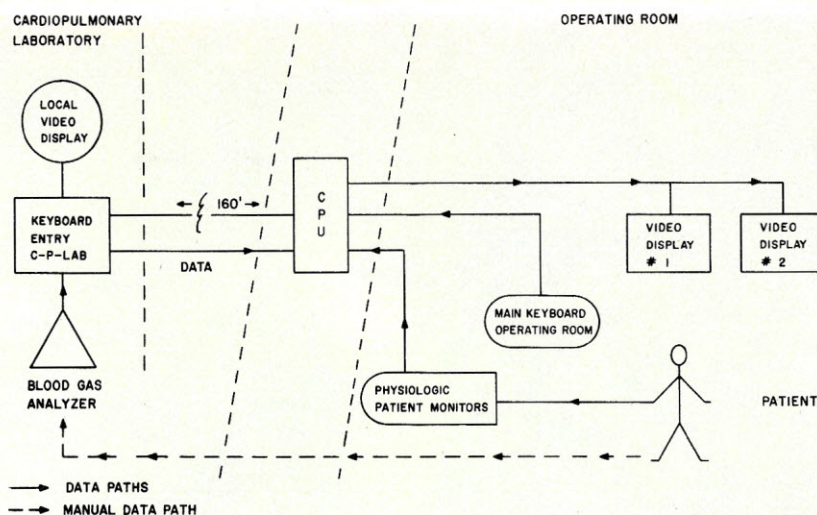


Fig. 1. Original system configuration.

which provided the results of periodic blood tests to determine the concentrations of oxygen, CO<sub>2</sub> and other medically-related parameters—was of primary import. The rest of the information, while nice to have, could be obtained manually nearly as fast, and with less clutter and complexity in an already-complex and cluttered operating room. With the hospital's director of information sciences, we determined that a microcomputer would fill our initial needs, and be able to handle future requirements.

Next we had to pick the equipment and a vendor. The system had to be available off-the-shelf, with support and assistance from the vendor, when we changed from one system to the other. It came down to the Apple and the Radio Shack TRS-80. We learned that no TRS-80s were available, but our local Apple dealer had both systems and system-assistance.

One fact was apparent to us from an administrative, technical and

medical viewpoint. The vendor had to offer a complete service, not just a microcomputer in a factory-sealed box. Without a continuing relationship and available support, the microcomputer would soon become more of a hindrance than a help. No software is 100 percent adaptable to all applications. We were lucky: our vendor was able to provide both the product and service.

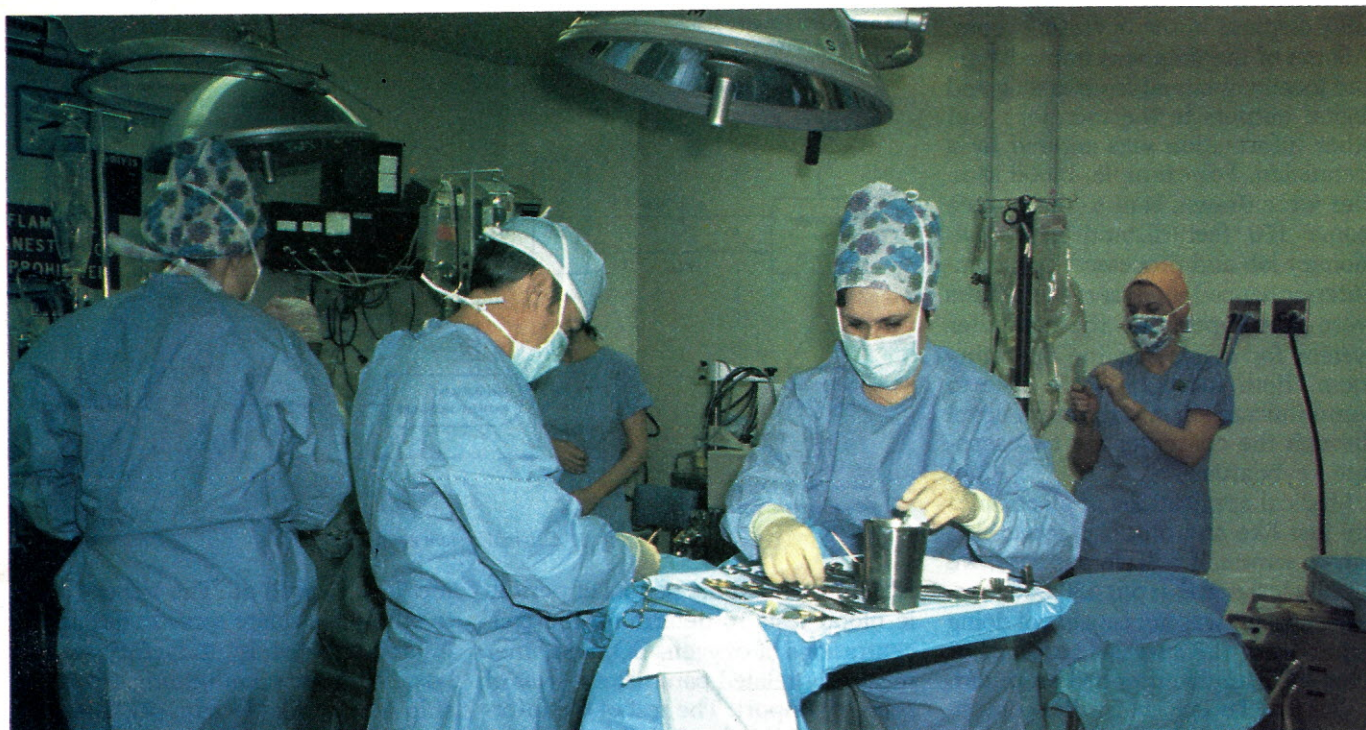
A number of questions and details remained to be resolved. We set up a meeting between representatives of the hospital administration, bio-medical engineering, the vendor and our perfusionist, Mary Willis. Willis' input and suggestions were particularly important: she operates the heart-lung bypass machine, and needs the data from the blood gas samples. During open-heart surgery, the patient's heart is actually stopped, and clear tubing links Willis' machine with the major blood vessels of the patient's circulatory system; the machine sup-

BLOOD GAS ANALYSIS REPORT:				<input type="checkbox"/> ARTERIAL <input type="checkbox"/> VENOUS	
TIME		SITE		F <sub>i</sub> O <sub>2</sub>	
PUNCTURE:		A.M. P.M.		%	
<input type="checkbox"/> MASK _____ LPM	<input type="checkbox"/> CMV _____	<input type="checkbox"/> T-TUBE _____	<input type="checkbox"/> V <sub>T</sub> _____		
<input type="checkbox"/> NASAL _____ LPM	<input type="checkbox"/> PEEP _____	<input type="checkbox"/> TOTAL R.R. _____	<input type="checkbox"/> SP _____		
	<input type="checkbox"/> IMV _____	<input type="checkbox"/> MIN. VOL. _____	<input type="checkbox"/> M _____		
PARAMETERS (RANGE)		PATIENT		PARAMETERS (RANGE)	
pH (7.40 ± .02)				HCO <sub>3</sub> <sup>-</sup> (24 ± 2)	
PCO <sub>2</sub> (40 ± 2 TORR)		TORR		TCO <sub>2</sub> (25 ± 2)	
PO <sub>2</sub> (90 ± 10 TORR)		TORR		BE (0 ± 2)	
				S <sub>a</sub> O <sub>2</sub> (97%)	
DATE		DRAWN BY		TEST DONE BY	
CHART					
PATIENT STAMP.					
COMMENTS					

MEMORIAL HOSPITAL - ORMOND BEACH.

Fig. 2. Blood gas report form.





*The surgical team in action in the operating room.*

Command	Activity
/CLEAR	Clears screen for new patient
/B	Rings bell
/Jx	Jump cursor to specific location (x) 1 to 4
/C	Clears current area cursor is in
/.	Clears the specific field
/	Back one display
RETURN	Advance to next display

*Table 1. Program instructions.*

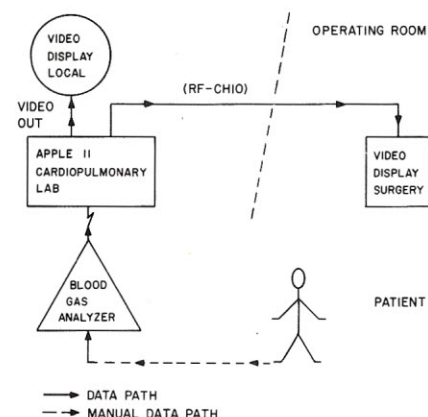
plies oxygenated blood throughout surgery. Typical pump runs are around two and a half hours, and constant adjustments must be made.

Also present was a member of our cardiopulmonary department to help define the format of the data, the types of data inputs and levels of operator expertise. It was essential that the system be easy to operate, with a minimum of specialized codes or instructions.

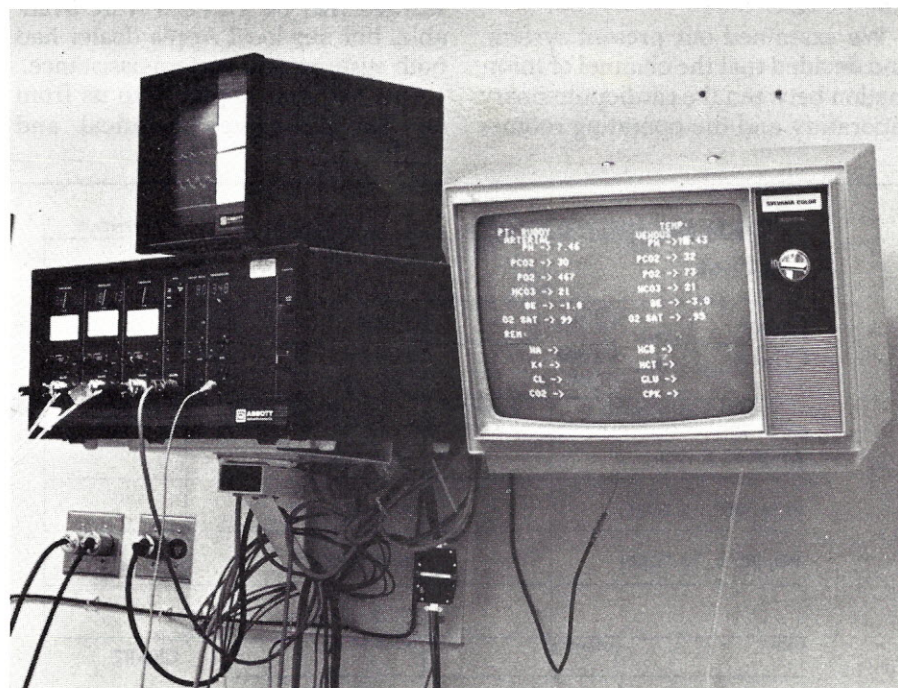
Data formatting, or the manner in which data was to be presented, was important. Each of the basic parameters was present in two distinctive tests, the venous and arterial sampling modes. It was critical to be able to immediately tell which was which; a mistake could materially affect the patient undergoing surgery. We experimented with a number of approaches and variations, before settling on a single standard format.

J1	Arterial
J2	Venous
J3	REM (remarks)
J4	Other lab data

*Table 2. Screen locations.*



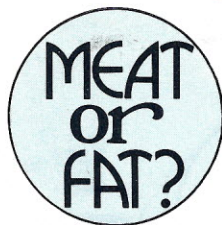
*Fig. 3. Apple system configuration.*



*The monitor system and video display in the open heart surgical suite.*

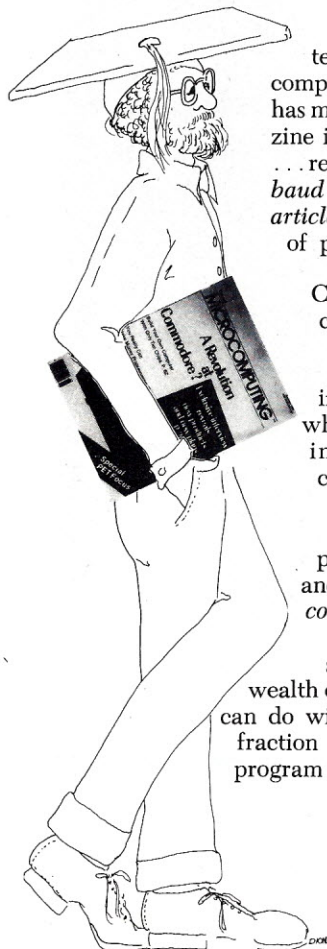


# Are you looking for...



When you subscribe to a magazine, you want to get **REAL SOLID INFORMATION**, not just a giant catalog of ads every month... and mostly the same ads, if you've noticed.

*Kilobaud Microcomputing has the meat:* feature articles written by the most knowledgeable people in the field, yet written for the relative newcomer to computing. *Kilobaud Microcomputing* has more articles than any other magazine in the field... by a wide margin... regardless of fatness. In 1980 *Kilobaud Microcomputing* published 409 articles... and that included a wealth of programs which you could use.



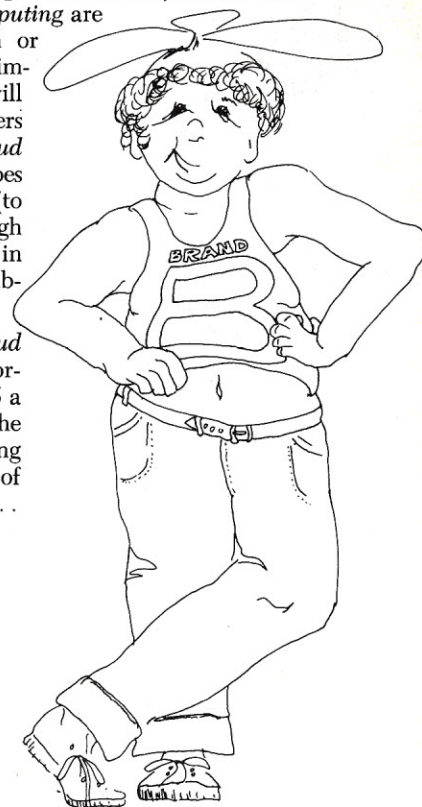
Compare that with 133 paltry articles in *Brand B*, the "Fat Albert" of the computer field. You can get far more from your computer if you can really understand it, which is where the simple articles in *Kilobaud Microcomputing* come in. You don't need a science degree to get through it like some magazines I could mention. The practical reviews of both hardware and software in *Kilobaud Microcomputing* can save you a bundle... far more than the cost of a subscription... even for life. The wealth of programs give you things you can do with your computer... again at a fraction of the cost of buying the same program over the counter. Further, the

articles on programs *help you learn* how to write and modify programs that you have to do yourself.

When you subscribe to a magazine, you want to pay for the information, not a bunch of ads. The advertisers are already paying for them so why should you? *Kilobaud Microcomputing* has been running around 40% advertising while *Brand B* has been running 60-70%, making fat issues, but with *little real information* for you.

You want to learn about computers as fast as you can. The editors of *Kilobaud Microcomputing* are under orders (pain of death or worse) to keep the material as simple as possible so new comers will be able to learn about computers as quickly as possible. *Kilobaud Microcomputing* covers all types of microcomputers, including (to some extent) the TRS-80 though this is covered overwhelmingly in *80 Microcomputing*, a sister publication.

At \$2.95 a copy, *Kilobaud Microcomputing* is the best information buy you'll find. At \$25 a year (you save \$10.40 off the newsstand price) you're investing in the most valuable library of microcomputing you can buy... 2,960 pages in 1980!




☐ So, please bill me \$25 for one year's subscription to *Kilobaud Microcomputing*.

Canadian \$27/1 year only, US funds.  
Foreign \$35/1 year only, US funds.  
Please allow 4-6 weeks for delivery.

name \_\_\_\_\_  
street \_\_\_\_\_  
city \_\_\_\_\_ state \_\_\_\_\_ zip \_\_\_\_\_

**Kilobaud Microcomputing • Box 997 • Farmingdale NY 11737**

is a division of  Peterborough NH 03458

31NB7



This format in many ways closely resembles Fig. 2, the standard blood gas analysis report form.

The vendor made several versions of a proposed program, leading to the one that has been used daily since October 1980. The program is loaded into the computer each morning via cassette and updated throughout the case by a cardiopulmonary technologist.

## The System

Our system consists of an Apple II with 32K RAM, a nine-inch video monitor and a 19-inch TV in the operating room. The data uses the Apple's ability to support both video and the internal rf modulator operating on VHF channel 10. Fig. 3 details the actual signal paths and configuration. We have deleted the two-way communications capability from the operating room to the blood gas lab, but have added reliability and simplicity to the system.

The Apple has proven itself able to operate through power fluctuations with nary a glitch or dropped bit. In fact, the only reported problem has been due to an operator leaning across the keyboard, which generated random and meaningless data on the video monitor and the slave TV.

The system as configured might seem like technological overkill, in that we are using a fraction of the memory. But we ordered the additional memory to let the Apple take on extra work. These additional tasks will include direct data input and processing from the physiological monitors, specific cardiovascular studies and profiles and patient data management.

## Conclusions

The acquisition of our microcomputer was an education. We went from a highly-advertised yet poorly-conceived and executed \$30,000 computer system to a simple, reliable and expandable microcomputer system which cost less than \$1600. We have found that we can peacefully coexist with a microcomputer system, and Apple has found itself a place on our open-heart surgical team.

I've included the complete program listing so that other hospitals can use the Apple in their own surgical settings. Any questions concerning the program or its operation should include a self-addressed stamped envelope. ■



Cardiopulmonary technologist enters the results of a blood gas analysis into the Apple and the results appear both on her monitor and in the operating room.

### Program listing.

```

3
3
3 PATIENT DATA SYSTEM FOR APPLE II
3 (C) 1981 MEMORIAL HOSPITAL, 875 STERTHAUS AVE. ORMOND BEACH FL 32074
3
3
3 LIST
1 DIM H1$(30),R$(30),V$(30),H$(30)
  L(30)
10 E = 24
20 GOSUB 3000
40 HOME
45 POKE 34,24
100 HOME : FOR L = 0 TO E
110 V$(L) = HTAB H(L)
120 PRINT H1$(L);R$(L)
130 NEXT L
1000 REM CONTROL OF CURSOR BLOC
  K
1001 IF I = 2 THEN I = 4
1002 IF I = 3 THEN I = 1
1010 IF I > E THEN PRINT "I = 0"
1012 IF I < 0 THEN PRINT "I = E"
1100 V$(I) = HTAB (H(I) + LEN
  (H1$(I)) - 1): INPUT A$
1110 IF A$ = "" THEN I = I + 1: GOTO
  100
1120 IF A$ = "/" THEN I = I - 1:
  GOTO 100
1130 IF A$ = "/CLEAR" THEN FOR
  C = 1 TO E:R$(C) = "
  : NEXT C:I = 0:R$(0) = "
  ": GOTO
  100
1135 IF A$ = "/" AND I = 16 THEN
  R$(16) = "

```



Program continued.

```

      *I = I + 1: GOTO 100
1140 IF A# = "/" THEN R#(I) = "
      *A# = "I = I + 1: GOTO
100
1150 IF A# = "/" THEN GOTO 200
0
1160 IF LEFT$(A#,2) = "/" THEN
GOTO 2500
1210 IF LEN(A#) > L(I) THEN A#
= LEFT$(A#,L(I))
1240 R#(I) = A#; I = I + 1: GOTO 1
00
2000 IF I < 10 AND I > 3 THEN FOR
Q = 4 TO 9: R#(Q) = "
: NEXT Q: I = 4: GOTO 100
2100 IF I < 16 AND I > 9 THEN FOR
Q = 10 TO 15: R#(Q) = "
: NEXT Q: I = 10: GOTO 100
2200 IF I < 21 AND I > 15 THEN FOR
Q = 16 TO 20: R#(Q) = "
: NEXT Q: R#(16) = "

      *I = 16: GOTO 100
2300 IF I > 20 THEN FOR Q = 21 TO
E: R#(Q) = "
: *I = 21: GOTO
100
2400 GOTO 100
2500 IF MID$(A#,3,1) = "1" THEN
I = 4: GOTO 100
2510 IF MID$(A#,3,1) = "2" THEN
I = 10: GOTO 100
2520 IF MID$(A#,3,1) = "3" THEN
I = 16: GOTO 100
2530 IF MID$(A#,3,1) = "4" THEN
I = 21: GOTO 100
2599 GOTO 100
3000 REM SET SCREEN DISPLAYS
3010 H$(0) = "PT -> "
3011 H$(1) = "TEMP -> "
3012 H$(2) = "ARTERIAL"
3013 H$(3) = "VENOUS"
3014 H$(4) = "PH -> "
3015 H$(5) = "PCO2 -> "
3016 H$(6) = "PO2 -> "
3017 H$(7) = "HCO3 -> "
3018 H$(8) = "BE -> "
3019 H$(9) = "O2 SAT -> "
3020 H$(10) = "PH -> "
3021 H$(11) = "PCO2 -> "
3022 H$(12) = "PO2 -> "
3023 H$(13) = "HCO3 -> "
3024 H$(14) = "BE -> "
3025 H$(15) = "O2 SAT -> "
3026 H$(16) = "REMARKS: "
3027 H$(17) = "NA -> "
3028 H$(18) = "K+ -> "
3029 H$(19) = "CL -> "
3030 H$(20) = "CO2 -> "
3031 H$(21) = "HGB -> "
3032 H$(22) = "HCT -> "
3033 H$(23) = "GLU -> "
3034 H$(24) = "CPK -> "
3090 FOR Q = 1 TO 10: SP# = SP# +
CHR$(95): NEXT ZR# = "000
0000000"
3100 V(0) = 1:H(0) = 1:L(0) = 25
3101 V(1) = 2:H(1) = 1:L(1) = 5
3102 V(2) = 4:H(2) = 1:L(2) = 0
3103 V(3) = 4:H(3) = 20:L(3) = 0
3104 V(4) = 4:H(4) = 1:L(4) = 7
3105 V(5) = 8:H(5) = 1:L(5) = 7
3106 V(6) = 10:H(6) = 1:L(6) = 7
3107 V(7) = 12:H(7) = 1:L(7) = 7
3108 V(8) = 14:H(8) = 1:L(8) = 7
3109 V(9) = 16:H(9) = 1:L(9) = 7
3110 V(10) = 4:H(10) = 21:L(10) =
7
3111 V(11) = 8:H(11) = 21:L(11) =
7
3112 V(12) = 10:H(12) = 21:L(12) =
7
3113 V(13) = 12:H(13) = 21:L(13) =
7
3114 V(14) = 14:H(14) = 21:L(14) =
7
3115 V(15) = 16:H(15) = 21:L(15) =
7
3116 V(16) = 18:H(16) = 1:L(16) =
49
3117 V(17) = 20:H(17) = 1:L(17) =
7
3118 V(18) = 21:H(18) = 1:L(18) =
7
3119 V(19) = 22:H(19) = 1:L(19) =
7
3120 V(20) = 23:H(20) = 1:L(20) =
7
3121 V(21) = 20:H(21) = 21:L(21) =
7
3122 V(22) = 21:H(22) = 21:L(22) =
7
3123 V(23) = 22:H(23) = 21:L(23) =
7
3124 V(24) = 23:H(24) = 21:L(24) =
7
3200 FOR Q = 0 TO E: R#(Q) = "
: *I = 21: GOTO 100
3499 RETURN

```

**FREE**  
with software purchase—  
One CPM Handbook

✓250

Ad#19

# DISCOUNT SOFTWARE

## ULTIMATE SOFTWARE PLAN

We'll match any advertised price on any item that we carry. And if you find a lower price on what you bought within 30 days of buying it, just show us the ad and we'll refund the difference. It's that simple.

Combine our price protection with the availability of full professional support and our automatic update service and you have the Ultimate Software Plan.

It's a convenient, uncomplicated, logical way to get your software.

CP/M<sup>®</sup> DISK WITH MANUAL ONLY

**ARTIFICIAL INTELLIGENCE**  
Medical(PAS-3).....\$849/\$40  
Dental (PAS-3).....\$849/\$40

**ASYST DESIGN**  
Prof Time Accounting.....\$549/\$40  
General Subroutine.....\$269/\$40  
Application Utilities.....\$439/\$40

**COMPLETE BUS. SYSTEMS**  
Creator.....\$269/\$25  
Reporter.....\$169/\$20  
Both.....\$399/\$45

**COMPUTER CONTROL**  
Fabs (B-tree).....\$159/\$20  
UltraSort II.....\$159/\$25

**COMPUTER PATHWAYS**  
Pearl (level 1).....\$ 99/\$25  
Pearl (level 2).....\$299/\$40  
Pearl (level 3).....\$549/\$50

**DIGITAL RESEARCH**  
CP/M 2.2  
NorthStar.....\$149/\$25  
TRS-80 Model II (P+T).....\$159/\$35  
Micropolis.....\$169/\$25  
Cromemco.....\$189/\$25  
PL/I-80.....\$459/\$35  
BT-80.....\$179/\$30  
Mac.....\$ 85/\$15  
Sid.....\$ 65/\$15  
Z-Sid.....\$ 90/\$15  
Tex.....\$ 90/\$15  
DeSpool.....\$ 50/\$10

**D.M.A.**  
Ascorm.....\$149/\$15  
DMA-DOS.....\$179/\$35  
CBS.....\$369/\$45  
Formula.....\$539/\$45

**GRAHAM-DORIAN**  
General Ledger.....\$729/\$40  
Acct Receivable.....\$729/\$40  
Acct Payable.....\$729/\$40  
Job Costing.....\$729/\$40  
Payroll II.....\$729/\$40  
Inventory II.....\$729/\$40  
Payroll.....\$493/\$40  
Inventory.....\$493/\$40  
Cash Register.....\$493/\$40  
Apartment Mgt.....\$493/\$40  
Surveying.....\$729/\$40  
Medical.....\$729/\$40  
Dental.....\$729/\$40

**MICRO-AP**  
S-Basic.....\$269/\$25  
Selector IV.....\$469/\$35

**MICRO DATA BASE SYSTEMS**  
HDBS.....\$269/\$35  
MDBS.....\$795/\$40  
DRS or QRS or RTL.....\$269/\$10  
MDBS PKG.....\$1295/\$60

**MICROPRO**  
WordStar.....\$319/\$60  
Customization Notes.....\$ 89/\$na  
Mail-Merge.....\$109/\$25  
WordStar/Mail-Merge.....\$419/\$85  
DataStar.....\$249/\$60  
WordMaster.....\$119/\$40  
SuperSort I.....\$199/\$40  
SpellStar.....\$175/\$40

**MICROSOFT**  
Basic-80.....\$289/\$na  
Basic Compiler.....\$329/\$na  
Fortran-80.....\$349/\$na  
Cobol-80.....\$574/\$na  
M-Sort.....\$124/\$na  
Macro-80.....\$144/\$na  
Edit-80.....\$ 84/\$na  
MuSimp/MuMath.....\$224/\$na  
MuLisp-80.....\$174/\$na

✓(New Items or new prices)

CP/M users: specify disk systems and formats. Most formats available.

**ORGANIC SOFTWARE**  
TextWriter III.....\$111/\$25  
DateBook II.....\$269/\$25  
Milestone.....\$269/\$30

**OSBORNE**  
General Ledger.....\$ 59/\$20  
Acct Rec/Acct Pay.....\$ 59/\$20  
Payroll w/Cost.....\$ 59/\$20  
All 3.....\$129/\$60  
All 3 + CBASIC-2.....\$199/\$75  
Enhanced Osborne.....\$269/\$60  
With "C" Basic.....\$349/\$75

**PEACHTREE<sup>®</sup>**  
General Ledger.....\$399/\$40  
Acct Receivable.....\$399/\$40  
Acct Payable.....\$399/\$40  
Payroll.....\$399/\$40  
Inventory.....\$399/\$40  
Surveyor.....\$399/\$40  
Property Mgt.....\$799/\$40  
CPA Client Write-up.....\$799/\$40  
P5 Version.....Add \$129

**SOFTWARE WORKS**  
Adapt (CDOS to CP/M).....\$ 69/\$na  
Ratfor.....\$ 86/\$na

**SOHO GROUP**  
MatchMaker.....\$ 97/\$20  
WorkSheet.....\$177/\$20

**STRUCTURED SYSTEMS**  
GL or AR or AP or Pay.....\$599/\$40  
Inventory Control.....\$599/\$40  
Analyst.....\$199/\$25  
Letterright.....\$179/\$25  
QSort.....\$ 89/\$20  
NAD.....\$ 87/\$20

**SUPERSOFT**  
Diagnostic I.....\$ 49/\$20  
Diagnostic II.....\$ 84/\$20  
Disk Doctor.....\$ 84/\$20  
Forth (8080 or Z80).....\$149/\$30  
Fortran.....\$219/\$30  
Fortran w/Ratfor.....\$289/\$35  
Other.....less 10%

**TCS**  
GL or AR or AP or Pay.....\$ 79/\$25  
All 4.....\$269/\$99  
Compiled each.....\$ 99/\$25

**UNICORN**  
Mince.....\$149/\$25  
Scribble.....\$149/\$25  
Both.....\$249/\$50

**WHITESMITHS**  
"C" Compiler.....\$800/\$30  
Pascal (incl "C").....\$850/\$45

**"DATA BASE"**  
FMS-80.....\$649/\$45  
dBASE II.....\$595/\$50  
Condor II.....\$899/\$50  
Access/80.....\$699/\$50  
Optimum.....\$749/\$50

**"PASCAL"**  
Pascal/MT+.....\$429/\$30  
Pascal/Z.....\$349/\$30  
Pascal/UCSD 4.0.....\$429/\$50  
Pascal/M.....\$189/\$20

**"WORD PROCESSING"**  
WordSearch.....\$179/\$50  
SpellGuard.....\$229/\$25  
VTS/80.....\$259/\$65  
Magic Wand.....\$289/\$45  
Spell Binder.....\$349/\$45

**"OTHER GOODIES"**  
✓ Select.....\$269/\$na  
✓ Forcaster.....\$199/\$na  
✓ Micro Plan.....\$419/\$na  
✓ The Last One.....\$549/\$na  
SuperCalc.....\$269/\$50  
Target.....\$189/\$30  
BSTAM.....\$149/\$15  
BSTMS.....\$149/\$15  
Tiny "C".....\$ 89/\$50  
Tiny "C" Compiler.....\$229/\$50  
CBASIC-2.....\$ 98/\$20  
Nevada Cobol.....\$129/\$25  
MicroStat.....\$224/\$25  
Vedit.....\$105/\$15  
MiniModel.....\$449/\$50  
StatPak.....\$449/\$40  
Micro B+.....\$229/\$20  
Raid.....\$224/\$35  
String/80.....\$ 84/\$20  
String/80 (source).....\$279/\$na  
ISIS II.....\$199/\$50  
Plan 80.....\$269/\$30

**APPLE II<sup>®</sup>**  
**INFO UNLIMITED**  
EasyWriter.....\$224  
Datedex.....\$349  
Other.....less 15%

**MICROSOFT**  
Softcard (Z-80 CP/M).....\$259  
Fortran.....\$179  
Cobol.....\$499

**MICROPRO**  
Wordstar.....\$269  
MailMerge.....\$ 99  
Wordstar/MailMerge.....\$349  
SuperSort I.....\$159  
Spellstar.....\$129

**PERSONAL SOFTWARE**  
Visicalc 3.3.....\$159  
CCA Data Mgr.....\$ 84  
Desktop/Plan II.....\$159  
Visiterm.....\$159  
Visiplot.....\$149  
Visitrend/Visiplot.....\$220  
Zork.....\$ 34

**PEACHTREE<sup>®</sup>**  
General Ledger.....\$224/\$40  
Acct Receivable.....\$224/\$40  
Acct Payable.....\$224/\$40  
Payroll.....\$224/\$40  
Inventory.....\$224/\$40

**"OTHER GOODIES"**  
dBASE II.....\$329/\$50  
VU #3R (usew/Visicalc).....\$ 79  
Context Connector (usew/Visicalc).....\$129  
Micro Courier.....\$219  
TCS Apple (complete business).....\$269/\$99  
Super-Text II.....\$127  
Data Factory.....\$134  
DB Master.....\$184  
Charles Mann.....less 15%  
STC.....less 15%

ORDERS ONLY—CALL TOLL FREE VISA • MASTERCARD

1-800-854-2003 ext. 823 • Calif. 1-800-522-1500 ext. 823

Overseas—add \$10 plus additional postage • Add \$2.50 postage and handling per each item • California residents add 6% sales tax • Allow 2 weeks on checks, C.O.D. ok • Prices subject to change without notice. All items subject to availability • ®—Mfgs. Trademark.

THE DISCOUNT SOFTWARE GROUP

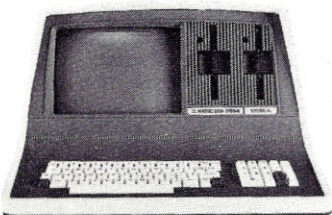
6520 Selma Ave. Suite 309 • Los Angeles, Ca. 90028 • (213) 666-7677

Int'l TELEX 499-0032 BVHL Attn: DiscSoft • USA TELEX 194-634 BVHL Attn: DiscSoft • TWX 910-321-3597 BVHL Attn: DiscSoft



# BRAINS-MAINFRAMES

## SUPERBRAINS



**SUPERBRAIN QD 64K**

List \$3995 only \$2949



**Z-89 48K**

List \$2895 only \$2139

### NORTH STARS

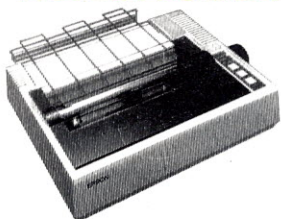
MINICOMPUTER  
PERFORMANCE  
GREEN PHOSPHOR  
OPTIONS:  
GRAPHICS + CP/M  
LIST \$3999  
ONLY \$2999

### ADVANTAGE



MONITOR GREEN PHOSPHOR \$129

**TERMINALS Z-19 \$725**  
**INTERTUBE III** only \$725



## EPSON

MX70 GRAPHICS	394
MX80 FT	598
MX-80	494
MX-100	749

ANADEx 9501	1290
NEC LETTER QUAL FT	CALL
DIP-81	395
DIP-84 FT GRAPHICS	595
STARWRITER LETTER QUAL FT	1824
MALIBU 200 DUAL MODE	2577
QANTEX W/BUFFER	1195



400	LIST 399	ONLY 340
800	1080	799

WONDERFUL GAMES-EDUCATION

RCA-COSMAC VP-711 199

GAMES-BASIC-PROGRAMS-MUSIC  
GUIDED SATELLITE TO SATURN

**TARBELL's** Empire I, II, & III have two 8" disk drives. The I is single sided, the II is double sided, and the Empire III has one of the floppies replaced by an 8-Megabyte Hard Disk. FREE BUSINESS SOFTWARE EMP 1 \$4888 **ONLY \$3666**

**CALIFORNIA COMPUTER 2200A**  
\$2195 **ONLY \$1795** Z80, 64K, I/O, DMA Disk controller + CP/M.

Model 300-1A is the larger system: 2.4 Mb 8", Z80, 64K, and optional OASIS, CP/M, or MP/M operating system. LIST \$5695 **ONLY \$4995**

**MORROW DESIGNS Decision 1** features UNIX plus CP/M. Multi user & Multi processing, 4 to 6 Mhz Z80, and optional Floating Point Processor, or Hard Disk 26Mb. A very powerful system at a saving. LIST \$1725 **ONLY \$1380.**

**GODBOUT COMPUPRO Big 8:** 6MHz Z80, DMA Disk Controller, 32K fast static RAM, Interfacer 1 I/O board, + CP/M. LIST \$1995 **ONLY \$1595**

Super Sixteen 8085/8088 is the fastest combo 8-16 CPU. LIST \$3495 **ONLY \$2795**

**SYSTEMS GROUP System 2812** runs CP/M or OASIS. Supports single user & multi-user & multi task. Up to 5 megabytes with 8" drives optional 10-megabyte hard disk. LIST \$5035 **ONLY \$3994**

**SSM** has introduced the Genesys Computer. It features a constant voltage transformer. It comes in several configurations: 12-slot, 22-slot, 5" to 8" floppy to Winchester. It's new, so give us a call.

**SEATTLE's** 16 bit COMPUTER is here! 8 MHz 8086 CPU the fastest S-100 computer! 128K Static RAM, DD Disk Controller, 22-slot Main Frame, 86-DOS BASIC-86. #2 128K LIST \$4185 **ONLY \$3349** #1 As above but 64K LIST \$3190 **ONLY \$2649**

WE SELL GOOD HARDWARE

square

WE SELL GOOD SOFTWARE

**American**



**Computers**

919-889-4577

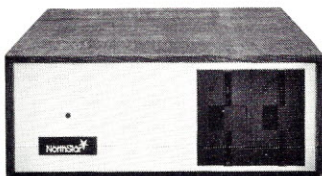
KIVETT DR. JAMESTOWN N.C. 27282

919-883-1105



# LOWEST PRICE - BEST QUALITY

## NORTH STAR



### North Star Horizon 2

2-5 1/4 Disk Drives  
32K Double Den  
Factory assem. & tested  
Factory guaranteed  
List \$3695

only **\$2625**

**POWERFUL NORTH STAR BASIC FREE  
SUPERB FOR BUSINESS & SCIENCE**

FACTORY ASSEMBLED & TESTED	LIST	ONLY
HORIZON-2-64K-DOUBLE DEN	\$4195	\$2875
HORIZON-2-32K-QUAD DENSITY	\$3995	\$2799
HORIZON-2-64K-QUAD	\$4495	\$3150
HORIZON-1-64K-Q-HD5	\$6695	\$4685
HORIZON RAM ASSM	48K = \$679	64K = \$879
HORIZON DISK DRIVE SALE	SAVE	\$445
MORROW HARD DISK 26Mb	\$4495	\$3395
NORTH STAR HARD DISK 18 Mb	\$5375	\$3923
NORTH STAR TIME SHARING MULTI-USER		CALL
ZBASIC 2 TO 5 TIMES FASTER!		\$350
SECRETARY WORD PROCESSOR		\$99
WORDSTAR WORD PROCESSOR		\$318
FLOATING POINT BOARD	\$399	\$319
OASIS MULTI-USER SOFTWARE	SAVE	CALL
CP/M FOR N* Extra features	\$230	\$220
MICRO MIKE SOFTWARE	SAVE	CALL
MICRO DISK SYSTEM DD	\$899	\$799
UCSD PASCAL II.0	\$199	\$159
EXTRA PRECISION BASIC		\$50
NORTHWORD	\$399	\$299
MAILMANAGER	\$299	\$224
INFOMANAGER	\$499	\$374
GENERAL LEDGER	\$999	\$749
ACCOUNTS RECEIVABLE	\$599	\$449
ACCOUNTS PAYABLE	\$599	\$449
INVENTORY	\$999	\$749
ORDER ENTRY	\$999	\$749

## InterSystems

### ITHACA INTERSYSTEMS 2A



Z-80A CPU 4 MHz  
64K Dynamic RAM  
Front panel  
V I/O—with interrupts  
FDCII Disk Controller  
20 slot motherboard

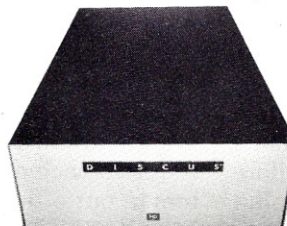
LIST \$3795 ONLY **\$2839**

PASCAL/Z + THE FASTEST PASCAL \$375

	LIST	ONLY
PASCAL SYSTEM 128K 2 DRIVES	\$7295	SAVE
CACHE BIOS SYSTEM 128K 2 DRIVES	\$6995	CALL
CP/M SYSTEM 64K 2 DRIVES	\$6295	SAVE
DPS-1 MAINFRAME WITH Z80A	\$1795	CALL
Z80 MACRO ASSEMBLER	\$125	SAVE
SPELL—PERFECT SPELLING	\$295	CALL
COMPARE—UTILITY SOFTWARE	\$295	SAVE
INTEREDIT—TEXT EDITOR	\$295	CALL

## MORROW 8" DISK

DISCUS 2D + CP/M\* 600K ONLY \$869  
DISCUS 2 + 2 + CP/M\* 1.2 MEGA B. \$1099  
ADD DRIVES 2D = \$599 2 + 2 = \$795  
DISCUS 2D-DUAL + CP/M\* ONLY \$1450  
FREE MICROSOFT BASIC FROM MORROW WITH  
DISCUS SYSTEM OR HARD DISK



MORROW HARD DISK  
26,000,000 BYTES!!  
LIST \$4495 ONLY **\$3395**  
CP/M\* IS INCLUDED!

2 QUME 2 SIDED DATATRAK 8 DRIVES  
IN DUAL CABINET

\$1640

## SAVE ON MEMORY AND PROGRAMS

SYSTEMS MEMORY 64K A&T	\$549	CORVUS HARD DISK	SAVE	ECOSOFT FULL ACCOUNTING	355	Which Computers are BEST?	FREE
SYSTEMS MEMORY 64K BANK	684	SSM VIDEO BRD VB3 4Mhz	412	CAT NOVATION MODEM	169	INSURED SHIPPING AT LOW RATES	
MICROANGELO	985	SPECTRUM COLOR UNKIT	289	MEMORY MERCHANT 16K	174	CALL FOR LATEST PRICES, DETAILS	
ITHACA MEMORY 8/16 BIT 64K	845	EZ-CODER English to BASIC	71	WICAT 68000 16-BIT	CALL	WE BEAT ADVERTISED PRICES	

FACTORY GUARANTEES

square

EXPERT ADVICE

American



Computers

919-889-4577

KIVETT DR. JAMESTOWN N.C. 27282

919-883-1105

\* CP/M is a registered trademark of Digital Research, Inc.



---

*When shuffling through mounds of paperwork became too much of a pain to bear, this doctor found the cure in microcomputers.*

---

# Just What the Doctor Ordered

By W.J. Blight

Over the past few years, an increasing amount of office overhead has been directly related to staff salaries. Small medical offices have done little to automate, as other businesses have. Our office reached the paperwork overload in 1978. I decided to take the plunge, and leased an Alpha Micro system with four floppy disk drives and an Intertube terminal and Superterm printer.

I didn't start out thinking in terms of micros. I thought at first that the project would be a larger experiment, and that the programming costs alone would reach \$45,000. I even applied to the National Health and Welfare office in Ottawa for a grant. But when I realized that a microcomputer might be able to do the job, the project seemed more manageable. So I struck out on my own to investigate the possibilities.

## Too Many Cards

Physicians in Canada face several problems unique to this country.

First, Canada has a universal health care system. All bills are paid by the government on behalf of the individual patients. Billing in Manitoba is done to the Manitoba Health Services Commission (MHSC) through an IBM-type claim card, which can be optically scanned for information. This card must be filled out by the office

staff and signed by the doctor for each patient visit to the office. These cards are then sent periodically to the Commission for payment, and payment to the doctors is made every two weeks, usually about four weeks after the patient's visit.

Doctors can bill patients privately, but must do so for all patients. A few specialists have opted out of the plan, while family physicians have stayed in the plan. In Manitoba only about 6 percent of all physicians have opted out.

Handling the Commission's cards is a big problem. About 60 cards are required each day from the two doctors in our office. This time-consuming job requires us to type repetitious demographic data on each card—patient's name, address, month and year of birth, etc. Frequent mistakes are made, usually by not recording the day of the visit or by typing a mistake in the date or the patient's health services number.

Another problem is with the ratification of the cards submitted. Some 450 to 500 cards are sent to the commission for each two-week period. When done manually, cards are provided in duplicate, the duplicate card being kept for ratification. They tend to be stored in the order in which the patients came in the office, but the listing of payments as returned by the

MHSC comes for each doctor with the patients listed in alphabetical order.

## Preliminaries

My practice has been located in a suburb of Winnipeg since 1962. I started as a solo practitioner, and later entered into a two-doctor partnership.

The clinic area is composed of five examination rooms, a small laboratory, general office and waiting room. The staff consists of a registered technologist and a licensed practical nurse. The LPN does the office work, along with such patient care as giving shots, putting on dressings and giving ultra sound treatments. The technologist spends about 75 percent of her time doing laboratory work, and the rest with general duties.

We also employed a typist and general office assistant, who worked about ten hours a week.

We see from 50 to 70 patients a day.

When I decided that automation would be an interesting and useful project, I felt that much programming would be needed to do patients' medical histories.

I applied to the NHW for a grant, but was turned down. Then I realized

---

*Address correspondence to W.J. Blight, M.D., C.C. F.P., Maginot Medical Centre, 690 Elizabeth Road, Winnipeg, Manitoba, Canada R2J 1A4.*

---





that microcomputers might be an answer, in which case I could start on my own.

I approached the Manitoba Health Services Commission, the paying agency in the province, to find out what criteria would have to be met if I implemented such an automated system. They were adamant that the present claim cards would have to be used. But they were willing to provide cards which could be handled by a printer automatically. Also, they would accept a computer signature on the cards.

We looked at two systems to provide printing. The first system, by IBM or Xerox, used a magnetic card typewriter. But we estimated that on a three-year basis, the cards would cost twice what a typewriter would. This led us to consider a microcomputer. A Byte Shop opened in Winnipeg, and I began to visit it, talking with them about the equipment they handled, and the capabilities of the machines being marketed.

First I had to know what information I needed to store on each patient. The minimum was the amount necessary to fill out the MHSC claim

card. I also wanted the middle name and the home and work phone numbers, and the first name of the head of the household. To access each record quickly, we would use a clinic number, to be given to each patient as their files were entered.

The data saved on each patient at this time was:

- Last name
- First name
- Second name
- First name of head of household
- Address
- City
- Province
- Postal code
- Day, month and year of birth
- Sex
- Marital status
- Home phone number
- Office phone number
- Manitoba Health Services number
- Clinic number

We required 120 bytes per patient to store this amount of information. We needed enough storage space for 2500 patients per doctor per year, and space for new patients.

Machines using tape as the main storage were too slow. Floppy disks

were starting to appear, and my impression was that an eight-inch disk would store about 2000 patients; four drives would be enough for several years. However, I knew that I would eventually have to use a hard disk.

A further consideration was service. No matter how sound the equipment, it would sooner or later require servicing. Many American-made computers would have to be sent back to the States through customs, which for all practical purposes was out of the question. We thus needed a Canadian dealer, preferably in Winnipeg, with local repair possible.

Initially only two systems looked at all possible: the Heath H11, which is based on DEC (Digital Equipment Corporation) equipment, and an Ohio Scientific. The Heath appeared to be adequate, but there were no floppy drives available, let alone hard disk.

Ohio Scientific took five months to send their material; this led me to conclude that they and their Canadian distributor would be unacceptable to deal with.

### Enter Alpha

In the interval, a few journals made



references to a company called Alpha Micro. I wrote them, and they put me in touch with a person who had just started to establish an Alpha dealership in Winnipeg. A demonstration of the machine and its capabilities followed, and I decided to buy it.

In mid-December of 1978 I received the first parts of the system and started learning the BASIC language. I decided that the best way to learn programming was to write enough of a program to be able to start using the equipment in the office. By Jan. 3, 1979, this initial program, although rudimentary, was working, and the equipment was in the office.

This first program entered the patient data into the file, and printed out the card to the Commission, with at least the patient's demographic data and the date on the card. The first few weeks were hectic, but by the third week the office staff noticed a reduction in the time necessary to print the cards.

Both the laboratory technician and the LPN learned quickly to operate the equipment. The program displayed instructions on the screen and we had few problems. One nice feature of doing the programming yourself is that if a step is not clear to the staff, they soon let you know. The staff soon named the computer FRED, which stands for:

Frankly  
Ridiculous  
Electronic  
Device

In March a new doctor came to work with me, and it became necessary to have cards printed for him. Along with this was needed an-

was slightly cheaper, the drugstore in the shopping center was interested in computerizing, so we went with their 90 megabyte Phoenix. Part of the

The program displayed instructions on the screen and we had few problems.

other day book entry. This was the next addition.

With the day book, we realized that if we saved the data on our patients, and then typed them out alphabetically at the end of each pay period, we could quickly ratify the listing of payments as sent out by the Manitoba Health Services Commission.

Presently card preparation took about 20 minutes each morning. This freed our LPN to do other work in the office.

We soon found one other use: letter-writing. A reasonably good text formatting program comes with the computer. The time spent on letters has been cut in half.

Benefits we now enjoy include the virtual elimination of improperly filled out cards from the Manitoba Health Services Commission. Once the initial data is entered, it is always reentered correctly on subsequent visits. The date of visit is automatically entered by the computer, and can never be forgotten.

We decided to expand to the hard disk after about nine months. Although the 10 megabyte Hawk drive of Control Data Corporation (CDC)

cost was offset by the drugstore's use of the system.

## Problems

One of the first changes necessary came from the realization that entering the first name of the head of the household had been a mistake. In trying to build a possible billing system, this piece of information was useless; we needed to enter the clinic number of the head of the household. I therefore changed the program to have the clinic number entered. At the same time, I was able to shorten the number of bytes necessary to hold the information, leaving me with space for additions. I also realized that eventually we would need to purge the files. I incorporated the year that the file had last been accessed. One weekend after these changes were made, the computer read each old record and converted it into the new record.

We also found that the floppy disks were very unreliable. Several boxes of disks could not be used at all, and had to be returned. I found also that I was able to store only about 1200 patients per disk.

Backup was another problem. Be-

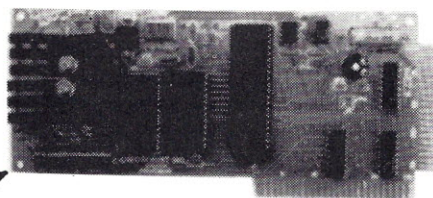
## "THIS IS DIGITALKER\*" OUT 127,0

This is all it takes to say this or 143 other expressions with MICROMOUTH\*. Absolutely no software drivers or subroutines to load. MICROMOUTH\*, the latest Circuit Cellar project can be used as an emergency annunciator, as an aid for the handicapped, for process control and automatic monitoring, and to add new dimensions to computer games.

Sample phrases that can be programmed are:  
"THE TIME IS 4 HOURS 23 MINUTES . . . (BEEP)"  
"NUMBER 4 IS 3.47 VOLTS"  
"THE SPEED IS 100 METERS A SECOND . . . SLOW DOWN"  
Thousands of expressions can be added by changing the ROM chips.

MICROMOUTH\* is plug compatible with APPLE II and TRS-80\* computers. Directions are included for S100, H8 and parallel port operation.

\*DIGITALKER is a trademark of National Semiconductor Corp.



(As featured in  
Byte June 81)

Complete Kit (as shown) \$120.00  
Assembled and tested:  
Apple II.....\$150.00  
TRS-80 Model I w/power  
supply, case, cable .....\$175.00  
TRS-80 Model III.....\$200.00

To order call:  
1-800-645-3479  
In N.Y. 516-374-6793

\*MICROMOUTH is a trademark of Micromint Inc.

The MicroMint Inc. ✓ 347  
917 Midway  
Woodmere, NY 11598  
Dealer inquiries  
invited.





# OSBORNE'S LATEST HITS

6 Brand New Books from Osborne/McGraw Hill

## Interfacing to S-100 (IEEE 696) Microcomputers

by Sol Libes and Mark Garetz

This book assists S-100 users in expanding the power and utility of their systems. It describes the S-100 bus with unmatched precision and detail. Various chapters describe its mechanical and functional design, logical and electrical relationships, bus interconnections, and bussing techniques. Both parallel and serial interfacing are described as well as interfacing to RAM, ROM, and the real world. Additional chapters discuss D/A and A/D conversion, interrupts, timers, and direct memory access.

#37-3 \$15 □

## Microprocessors for Measurement and Control

by D.M. Auslander and P. Sagues

Learn to design mechanical and process equipment which use microprocessor based "real time" computer systems. This book shows you how, and, using case studies, builds and explores problems of increasing complexity. The book presents plans for prototype systems, allowing readers (even those unfamiliar with machine or assembly language) to initiate projects and carry them through to completion.

#57-8 \$15.99 □

## Science and Engineering BASIC Programs

edited by John Heilborn

50 programs with a wide range of scientific and engineering applications - Clearly documented and easily adapted for any popular microcomputer - This book is an indispensable tool for any scientist, engineer or student. Included are programs for interpolation, regression, data analysis, roots of polynomials, matrix operations, and linear equations. You'll also find programs for eigenvalues and eigenvectors, differential equations, Fourier analysis, Structural analysis, thermodynamics, and many others.

#63-2 \$15.99 □

## CBASIC™ User's Guide

by Gordon Eubanks, Adam Osborne, and Martin McNiff

The CBASIC language may be the most advanced version of BASIC yet created. Like Pascal, CBASIC requires no line numbers and lends itself to highly organized, structured programs—programs that are readable, modular, and easier to change. CBASIC is as easy to learn as BASIC and contains convenient file handling facilities, making it very useful for many business applications. It may be the only computer language you'll ever need to learn. This guide was co-authored by Gordon Eubanks, the creator of CBASIC. It is not only a self-teaching textbook, it is the definitive reference on the CBASIC language.

#61-6 \$15 □

## ATARI™

### Some Common BASIC Programs

## TRS-80™ level II

### Some Common BASIC Programs

Two new editions of Osborne's celebrated collection of 76 useful and informative programs in Math, Finance, and Statistics. These programs will transform your Atari 400 or 800 or your TRS-80 computer from a plaything into a real workhorse. The programs are clearly documented to serve as a valuable instructional aid in learning BASIC.

ATARI version: #53-5 \$14.99 □

TRS-80 level II version: #54-3 \$14.99 □

Make check payable to:  **OSBORNE/McGraw-Hill** 149  
630 Bancroft Way, Berkeley, CA 94710 Dept. K13

Phone: (415) 548-2805

TOLL FREE: 800-227-2895 Outside California



Name

Address

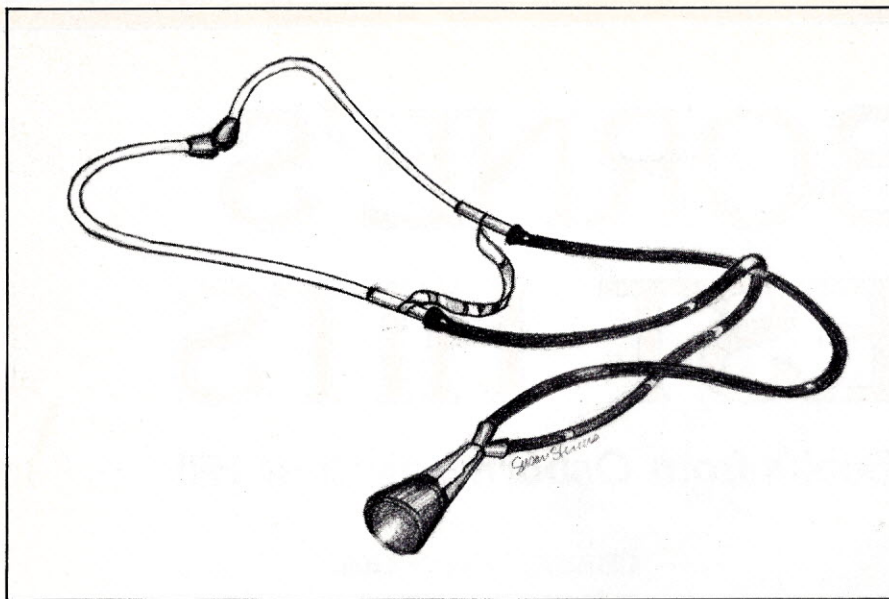
City/State/Zip

Plus ☐ .75/item 4th class ☐ \$1.50/item UPS ☐ \$2.50/item Air Mail ☐ \$10.00/Overseas (California Residents add applicable tax.)  
☐ Please send me your free catalog.

Total amount enclosed \$  or charge my ☐ Visa ☐ Mastercharge Card #  Expiration Date

Signature





cause the floppies were so bad, I felt that I had to have at least two backup copies of each one. Each of the four disks required about five minutes to do each evening. The staff has enjoyed the hard disk for the ease of backing up the records.

The floppies were our only major equipment error. We should have gone for a small hard disk unit right from the start. The down time is slight, with one exception—we suffered a head crash after 13 months of operation.

The system ran for about 14 hours a day until November of 1979. Since that time it has been in use 24 hours a day. Other failures in that time have included three memory chips. Two of these took place within a few months of new boards being first operated, one in a board after two and a half years of operation.

One further deficiency has been in the printers. Superterm printers were bought for both my office and for the drugstore. After about a year, parts started to break. When we tried to obtain parts, we were told that the company was no longer making printers, had discontinued all parts for the ones that they had made, and had apparently no interest in helping to find parts necessary. In one case it took us three months to track down a chip. We've started to convert to Texas Instruments printers, and will try to keep one of the old ones running by using parts from the other one.

Another problem encountered was with the growth of the program. Each addition makes the program longer and more complex. Finally you either run out of internal memory, or you

have to start splitting your programs into smaller segments and run them through a menu. Especially when working with floppies, this becomes very frustrating.

I started with a small program to print only the demographic data on the cards. As part of this I had to be able to enter and store all the pertinent information. Now, what happens if there is a typing mistake or the patient moves? You need a change program to change the data in the files. What happens if they move to another city? Make a deletion program. Now comes the request from the staff to have a day book. Okay, write a little program. Dr. X comes to the practice—change the program. Or I need a card for yesterday for this patient—change the program. Wouldn't it be nice to be able to look up the patient's records without knowing the full name, or the clinic number—a generic search program.

The power supply has been a major concern. Microcomputers are sold with the idea that they can run on the regular power supply as provided. Now I realize why there are so many ads in the magazines for power protectors. It becomes very frustrating when you have to press the reset button up to 12 times a day. We've tried to isolate some of these, some with success and some without. It is possible that some are due to other equipment within the shopping center. On investigating the power supply, we also found that all the grounds in the center were tied together. So we isolated the grounds to the computer, which helped considerably. One other answer was to put a choke in the

computer to try to maintain the cycles at 60.

Due to our cold weather, interior car warmers are frequently installed, and the cars belonging to employees of the shopping center are plugged in during the day. On the very cold days, we still have a lot of trouble, possibly due to the overuse of these warmers.

One other interesting problem is the vacuum cleaner used in cleaning the office. It has created some rather weird problems; for instance, the computer has tried to call out on the phone line of the modem.

### Confidentiality of Records

Much has been written in the past few years on the need for confidentiality of records. Most of the fears of doctors and other persons are for the potential abuse in large systems. If, for example, all patients in Manitoba had their records entered in one computer—for all reasons, including health and governmental agencies—health records might be accessed by people in other areas. Certainly by having many smaller computers scattered through the province, each with only parts of the total information, there is less chance of leakage.

In our computer and most others, password control can be or is built into the system. Each program or file is entered into the storage unit in blocked areas. Access to these areas is through entry of a password. Even within programs, passwords can be built in, so that individuals might be given access to certain parts of the records. Trust must still be placed in the individuals who have the ability to access the records, the same as is given to those with access to the paper records.

### Further Development of the System

We've already started to use the computer for our general accounting. In a small office like ours, the programs necessary are very simple. I've written programs to do billing to insurance companies, record payment and do the general ledger. Checks are typed by the computer, with the recording of the check being carried out into the general ledger.

We anticipate that we should be able to put the entire patient record onto the computer, for easy retrieval of data, thus forming an automated record system. This would then allow use of the data in research into disease.

Discussions are currently going on



with the Manitoba Health Services Commission which will lead to trials of sending the information for billing to them over the phone lines, with the payment information in turn being sent to us by phone lines. Verification of claims paid could then be done automatically by the computer.

As we progressed to having the entire card filled out by the computer, we realized that a work sheet was needed. We prepared a two-part work sheet, the second sheet being the prescription pad. One danger of practice in the larger centers is of having prescription pads stolen, and prescriptions forged for drugs. This is no longer possible with our system, since the top of each prescription must be typed by the computer with the name and age of the patient, and the date seen.

At the end of 1979, I felt that it would be interesting to have an age-sex distribution on the patients seen. The program took about 30 minutes to write, and now takes about ten minutes to run at the end of each year.

The acceptance by the office staff has been great, the only question usually being "Why can't Fred...?" The important feature of use of develop-



ments in the office such as a computer must be in having the cooperation of the staff, in the planning of the move into the field, and their help in understanding why on occasion, with the introduction of a new program, it will "bomb."

One point must be emphasized—the programs in use now are all ones we developed. We've encountered some delays through programming errors, but these were anticipated by myself

and the staff, and have not caused too much frustration. With a major change, we can always fall back on the old program, if the new one doesn't work right.

## Conclusion

The use of a microcomputer in a two-doctor office appears to be cost justified, if it is added at a time when the office is considering new staff. In a larger office cost reductions can probably be achieved through the use of the computer and increased efficiency of the present staff.

Although few programs are yet available on the market in this field, more will arrive and the quality will increase. Hardware costs have been dropping at about 20 percent per year; this is likely to continue for some time. However, the cost of the programs is likely to increase as the salaries of the programmers increase.

Many articles on computerization, both in medicine and in general, have been saying that the technology is coming and we should be prepared to look at it. But the technology is here, the programs are available, and now is the time to consider office automation. ■

## RM/COBOL MAKES IT ACROSS!

**...FROM ONE OPERATING SYSTEM TO ANOTHER! A VITAL WAY TO PROTECT YOUR SOFTWARE INVESTMENT FOR THE FUTURE!**

The **RM/COBOL** language runs on more different Operating Systems and more different-sized computers than any other similar language. For starters, it runs on NCR and TI minicomputers and, in the micro field, on the CP/M<sup>®</sup>, MP/M<sup>®</sup>, TRSDOS<sup>®</sup>, OASIS<sup>®</sup>, MOASIS<sup>®</sup>, and UNIX<sup>®</sup> (ONYX version) Operating Systems...to mention only a few.

Until now, serious business software of the scope and flexibility seen in the minicomputer world has not been available on micros. **RM/COBOL** now allows transfer of such software with a minimum of fuss.

We have participated in such a mini-to-micro transfer of a major set of general business software...using **RM/COBOL** as the transfer mechanism, of course. Running on literally thousands of minicomputers, these refined, enhanced, and proven software packages cover A/R, A/P, G/L, P/R, Order Entry (with Invoicing and Inventory Control) as well as Sales Analysis. The packages define a new level of achievement for features and flexibility in micro applications software and offer top quality at a reasonable price.

For immediate information, call 714-848-1922 for your complete product descriptions.

**...PLUS ALL THE OLD, FAMILIAR FAVORITES** that we continue to offer, such as:

**General Business**—Client Accounting (CPA Write-up)  
FMS<sup>®</sup> (Financial Modeling System)  
NAD<sup>®</sup> (Name and Address System)

**Real Estate**—REAP (Real Estate Acquisition Programs)  
PMS (Property Management System)  
MLS<sup>®</sup> (Multiple Listing System)

**Health Care**—APH<sup>®</sup> (Automated Patient History)

**Word Processing and System Software**—Magic Wand<sup>®</sup>  
QSORT<sup>®</sup>  
CBASIC2<sup>10</sup>

MR. SMITH: THIS SOFTWARE WILL DEFINITELY ENHANCE YOUR CURRENT DATA PROCESSING FINANCIAL INDEXING RETRIEVABILITY.



and Cybernetics' unique TRS-80<sup>®</sup>, Model II CP/M offering high performance, hard disk support, and CP/M compatibility.

### Trademarks of:

1—Ryan McFarland Corp.; 2—Digital Research, Inc.; 3—Tandy Corp.; 4—Phase One Systems, Inc.; 5—Bell Telephone Laboratories, Inc.; 6—American Business Systems, Inc.; 7—Structured Systems Group, Inc.; 8—Cybernetics, Inc.; 9—Peachtree Software, Inc.; 10—Compiler Systems, Inc.



(714)848-1922

8041 NEWMAN AVE., SUITE 208  
HUNTINGTON BEACH, CA 92647



# **"I see Instant Software in your future..."**

**"....It's becoming very clear now...  
Your microcomputing life is going to be very  
exciting... Money! I see much**

**money for you. Perhaps it is the  
money you will gain when**

**Instant Software's new  
business applications**

**guide your financial  
endeavors. I see**

**travel... you will  
journey to distant**

**worlds in distant  
times. You will build**

**kingdoms from des-  
erts and armies**

**from slaves. Never  
will you be bored,**

**adventurous one! Your  
programming burdens will**

**lighten with new utilities—new  
tools. I see color! Many**

**bright colors! I see new  
packaging for all these trea-**

**sures... everything new!  
And... yes, a tall, hand-**

**some stranger who will  
guide you to these won-**

**ders. It will be your In-  
stant Software dealer—**

**a wise one indeed. All  
awaits you—all is**

**yours for the asking.  
Soon... very soon!"**





# Get a glimpse of the future today—at your nearest Instant Software dealer.

## ALABAMA

THE COMPUTER SHOP, Gadsden  
**ALASKA**  
COMPUTER TALK, Anchorage  
JUNEAU ELECTRONICS, Juneau  
WAPATO, Anchorage

## ARIZONA

COMPUTER STORE, Phoenix  
MESA ELECTRONICS, Mesa  
MILLET'S ELECTRONICS, Mesa  
PERSONAL COMPUTER PLACE, Mesa  
SIMUTEK, Tucson  
SOFTWARE STATION, Tempe  
TOY BOX, Sierra Vista

## ARKANSAS

MICRO COMPUTER SYSTEMS, Hot Springs

## CALIFORNIA

ADVANCE RADIO (R/S DEALER), Grass Valley  
ADVANCED COMPUTER PRODUCTS, Santa Ana  
ALLTRONICS, San Jose  
AMCO ELECTRONIC SUPPLY, Azusa  
ASAP COMPUTERS, Signal Hill  
BYTE INDUSTRIES, Hayward  
BYTE SHOP, Mountain View  
CAPITOL COMPUTER SYSTEMS, Sacramento  
COAST ELECTRONICS, Morro Bay  
COMPSOUND, Orange  
COMPUTER MART OF CALIFORNIA, INC.,  
Diamond Bar  
COMPUTER PLUS, Sunnyvale  
COMPUTER STORE, San Leandro  
COMPUTER WORLD, Westminster  
DEFENSEAR APPLIANCE & REPAIR, Weaverly  
DIMENSIONAL SOFTWARE, San Diego  
EXATRON, Santa Clara  
GAME-O-RAMA, Santa Barbara  
GRAY MATTER, San Francisco  
HOBBY WORLD ELECTRONICS, Northridge  
HUNTINGTON COMPUTING, Corcoran  
MALIBU MICROCOMPUTING, Malibu  
MICRO SPECIALTIES, Daily City  
MN&T INDUSTRIES, Lompoc  
OPAMP/TECHNICAL BOOKS, Los Angeles  
OPPORTUNITIES FOR LEARNING, Chatsworth  
PC COMPUTERS, El Cerrito  
Q1 COMPUTERS, INC., Lawndale  
RAC PRODUCTS, San Jose  
RADIO SHACK, El Cajon  
RADIO SHACK, Palm Springs  
RADIO SHACK, San Diego  
RAY SOUND (R/S DEALER), Fortuna  
SALINAS HOBBY CENTER, Salinas  
SHAVER SPUR, San Jose  
SILVER SPUR ELECTRONICS, Chino  
SOFTWARE PLUS, El Toro  
STACEY'S BOOKSTORE, San Francisco  
STRAKFLOWER ELECTRONICS (R/S DEALER),  
Half Moon Bay

THE COMPUTER STORE, Santa Monica  
THE FEDERATED GROUP, Commerce  
THE SOFTWARE STORE, Huntington Beach  
WABASH APPLE, El Toro  
WARRIORS, WIZARDS & ROBOTS, Garden Grove  
WENNER BUSINESS SYSTEMS, Los Altos

## COLORADO

APPARAT, Denver  
FISTEL'S MICRO ELECTRONICS, Denver  
POOR RICHARD'S CALCULATORS, Fort Collins  
SOFTWARE GOURMET, Denver

## CONNECTICUT

AMERICAN BUSINESS COMPUTERS, Grotton  
BYTE ME COMPUTER SHOP, New London  
COMPUTER LAB, New London  
INSTRUCTIONAL SYSTEMS COMPUTERS,  
Manchester

## DELAWARE

TECHNOLOGY SYSTEMS, Bethel  
THE COMPUTER STORE, Stamford

## DISTRICT OF COLUMBIA

THE PROGRAM STORE, Washington, D.C.

## FLORIDA

ADVENTURE INTERNATIONAL, Casselberry  
ALL SYSTEMS GO, Winter Garden  
AMF MICROCOMPUTER CENTER, Tampa  
COMPUTER CENTER, West Palm  
COMPUTER JUNCTION, Fort Lauderdale  
COMPUTER WORLDS, Clearwater  
COMPUTERLAND, Jacksonville  
COMPUTERLAND, Sarasota  
COMPUTERLAND, Tampa  
COMPUTERLAND, West Palm Beach  
HEATHKIT ELECTRONIC CENTER, Hialeah  
H&H HOBBY SALES, Sarasota  
MICROCOMP LTD., Miami  
MICROCOMPUTER SYSTEMS INC., Tampa  
MINI CONCEPTS, Holly Hill  
SAV-A-BYTE, Jacksonville  
SOUND IDEAS, Gainesville  
SOUTH EAST MICRO DATA, Orlando

## GEORGIA

ATLANTA COMPUTER MART, Atlanta  
BAILEY'S COMPUTER SHOP, Augusta  
DELTA DATA DYNAMICS, Tucker  
ENERGY LOGIC, Columbus  
FLEMING DRUG CO., Wrens  
**HAWAII**  
HONOLULU ELECTRONICS, Honolulu  
MILLS ELECTRONICS, Lahaina  
RADIO SHACK ASSOC. STORE, Honolulu  
**IDAHO**  
DENNIS STONE ENTERPRISES, Fruitland  
ELECTRONIC SPECIALTIES, Boise  
RAL DATA SYSTEMS, Idaho Falls  
**ILLINOIS**  
ALPINE COMPUTER CENTER, Rockford  
BELL ELECTRONICS, Edinboro  
CHICAGO MAIN NEWSTAND, Evanston  
COMPREHENSIVE MICRO SYSTEMS, Chicago  
COMPUTER JUNCTION, Elmhurst  
COMPUTER STORE, Rockford  
COMPUTERLAND, Niles  
CREATIVE PROGRAMMING, Charleston  
GARCIA & ASSOCIATES, Chicago  
ILLINOIS CUSTOM COMPUTERS, Harrisburg  
MAIN STREET COMPUTER CO., Decatur  
MIDWEST MICRO COMPUTERS, Lombard  
THE PILOT HOUSE, Gladstone  
WALLACE COMPUTERS, Peoria

## INDIANA

ABC HOBBY, Evansville  
DIGITAL TECHNOLOGY, Lafayette  
FALL CREEK ELECTRONICS, Pendleton  
GAME HUT, Bloomington  
GAME PRESERVE, Indianapolis  
PROFESSIONAL MICROCOMPUTER  
SOFTWARE, Muncie  
SIMONTON LAKE DRUGS, Elkhart  
THE BOARDROOM, Indianapolis  
THE HAM SHACK, Evansville

## IOWA

LENWOOD SYSTEMS, Center Point  
MEMORY BANK INC., Bettendorf  
SERNETT LEISURE CENTER, Carroll  
**KANSAS**  
AMATEUR RADIO EQUIPMENT, Wichita  
CENTRAL KANSAS COMPUTERS, Herington  
COMMUNICATIONS CENTER, Lincoln  
GOSUB INTL, Wichita  
HATCH COMPUTER CENTER, Alliance  
HIGH TECHNOLOGY, Wichita

## KENTUCKY

COMPUTER MAGIC, Louisville  
PERRY'S COMPUTER, Bremen  
**LOUISIANA**  
ACME BOOK CO., Baton Rouge  
COMPUTER SHOPPE, Metairie

## MAINE

FRYBURG COMPUTER CENTER, Fryeburg  
MAINE MICRO SYSTEMS INC., Auburn  
MID-MAINE COMPUTER COMPANY, Auburn  
PORTSMOUTH COMPUTER CENTER,  
Portsmouth

## MARYLAND

COMM CENTER, Laurel  
PROGRAM STORE, Baltimore  
WILLS COMPUTER STORE, Marlow Heights

## MASSACHUSETTS

COMPUTER CITY, Charlestown  
HI FI EXCHANGE, Northampton  
LAND OF ELECTRONICS, Lynn  
MARK GORDON COMPUTERS, Cambridge  
OMNITEK SYSTEMS, Tewksbury  
SOUND COMPANY, Springfield  
STAR COMPUTING, Framingham  
THE GAME SHOP, East Acton  
TUFTS RADIO ELECTRONICS, Medford

## MICHIGAN

ALL FOR LEARNING, W. Bloomfield  
ALTERNATE SOURCE, Lansing  
A.M. ELECTRONICS, Ann Arbor  
COMIC KINGDOM, Detroit  
COMPUTER CENTER, Garden City  
COMPUTER CONNECTION, Farmington Hills  
COMPUTER MART, Clawson  
COMPUTER MART, Flint  
COMPUTERLAND, Kentwood  
COMPUTERLAND, Southfield  
COMPUTRONIX, Midland  
EIGHT BIT CORNER, Muskegon  
FERRIS RADIO, Hazel Park  
HOBBY HOUSE, Battle Creek  
LEARNING CENTER LTD., Ann Arbor  
MAIN SYSTEMS, INC., Flint  
MID-MICHIGAN MEMORY, Dimondale  
NEWMAN COMPUTER EXCHANGE, Ann Arbor  
TRI-COUNTY ELECTRONICS & SOUND  
CENTER, Fenton  
WEATHERWAX DRUGS, Brooklyn  
WIZARD'S ARSENAL, East Lansing  
YE OLDE TEACHERS SHOPPE, Ypsilanti

## MINNESOTA

CODE ROOM, Eden Prairie  
MINNESOTA SOFTWARE, White Bear Lake  
RURAL AMERICA ENTERPRISES, Marshall  
ZIM COMPUTERS, Brooklyn Center  
**MISSISSIPPI**  
C-OM, Jackson  
DYER'S INC., West Point  
SOFTWAREHOUSE, Jackson

## MISSOURI

CENTURY NEXT COMPUTERS, Columbia  
COMPUTER CENTER, Joplin  
COMPUTERS, Florissant  
CRC COMPUTERS, Joplin  
D/S, Cameron  
HOUSE OF COMPUTERS, Joplin  
SOFTWARE SHACK, Belton

## MONTANA

COMPUTER STORE, Billings

THE COMPUTER PLACE, Kalispell

## NEBRASKA

APPLETREE SOFTWARE, Battle Creek  
COMPUTERS WEST, Omaha  
GREAT RACE HOBBY PLACE, Lincoln  
LEZOTTE STUDIO, Ogallala

## NEVADA

CENTURY 23, Las Vegas  
HURLEY ELECTRONICS, Las Vegas  
**NEW HAMPSHIRE**  
BITSNBYTES COMPUTER CENTER, Concord  
COMPUKRAFT, Keene  
COVER CRAFT, Amherst  
PAUL'S TV, Fremont  
PORTSMOUTH COMPUTER CENTER,  
Portsmouth  
RADIO SHACK ASSOC. STORE, Keene  
STURDIVANT AND DUNN, Conway

## NEW JERSEY

ABC'S TV SALES & SERVICE, Glassboro  
ADELMAN'S STATIONERY CO., Union City  
BARGAIN BROTHERS, West Trenton  
CHANNEL 1 RADIO SHACK, Medford  
COMPUTER FORUM, Redbank  
COMPUTER MADNESS, Englishtown  
COMPUTERWORLD OF WESTFIELD, Westfield  
CROWLEY'S, Whitehouse Station  
DAVE'S ELECTRONICS, INC., Pennsville  
ELECTRONIC WORLD, Mantua  
HOBBYMASTERS, Red Bank  
J&J ELECTRONIC WORLD, Mantua  
JANSEN ELECTRONICS, INC., Denville  
MIDAS DATA SYSTEMS INC., Marlton  
OMNIFAX, Cherry Hill  
RADIO SHACK ASSOC. STORE, Moorestown  
RADIO UNLIMITED, Somerset  
SOFTWARE CITY, River Edge

## NEW MEXICO

AUTEL ELECTRONICS CO., Albuquerque  
JAW ENTERPRISES, Clovis  
MITCHELL MUSIC, Carlsbad  
THOMAS E. CARR JEWELER, Alamogordo  
WARGAMES WEST, Albuquerque

## NEW YORK

ARISTO CRAFT DISTINCTIVE MINIATURES,  
New York  
ASD HOME COMPUTER CENTER,  
Poughkeepsie  
BERLINER COMPUTER CENTER,  
New Hyde Park  
C. HABILD OF NEW DORP, Staten Island  
COMPUTER CORNER, White Plains  
COMPUTER RESOURCES, Williamsville  
COMPUTER SHOP, Kingston  
COMPUTERLAND, Carle Place  
COMPUTERLAND OF N.Y.C., New York  
DIGIBYTE SYSTEMS, New York  
80-MICROCOMPUTER SERVICES, Cohoes  
FUTURE VISIONS COMPUTER STORE, Melville  
PHANTOMS RESEARCH, Camillus  
PROGRAMS UNLIMITED, Jericho  
MR. COMPUTER, Wappingers Falls  
OMNIFAX, DeWitt  
SOFTRON SYSTEMS, Rensselaer  
WATERLOO HOBBIES, Mineola  
WORLD OF COMPUTERS, Port Chester

## NORTH CAROLINA

RAYBURN MICRO-ELECTRONICS, Sylva  
SOUND MILL, Havelock

## OHIO

ABACUS II, Toledo  
ALTAR SYSTEMS, INC., Dayton  
ASTRO VIDEO ELECTRONICS, INC., Lancaster  
CINCINNATI COMPUTER STORE, Cincinnati  
COMPUTER STORE, Toledo  
COMPUTERLAND, Columbus  
COMPUTERLAND, Mayfield Heights  
COMPUTERLAND, North Olmsted  
COMPUTERLAND, Warren  
JOBAR ENTERPRISES, Middlefield

## MICROAGE, Columbus

MICRO COMPUTER CENTER, Centerville  
MICRO ELECTRONICS INC., Columbus  
MICRO-MINI COMPUTER WORLD, Columbus  
TWENTY-FIRST CENTURY SHOP, Cincinnati  
WANNA PLAY, Cincinnati  
**OKLAHOMA**  
COMPUTER STORE, INC., Tulsa  
COMPUTER WORLD, Tulsa  
PROFILE INC., Moore  
RADIO SHACK ASSOC. STORE, Guymon  
SOUNDS, ETC., Watonga

## OREGON

COMPUTER PATHWAYS, Salem  
LSR ELECTRONICS, Grant Pass  
PIONEER ELECTRONICS, Sandy  
TRS-80 PRODUCTS LTD., Portland

## PENNSYLVANIA

ALLIED HOBBIES, Philadelphia  
ARTCO ELECTRONICS, Kingston  
BELL ELECTRONICS, Girard  
COMPUTERLAND, Gibsonia  
COMPUTERLAND OF HARRISBURG,  
Mechanicsburg  
ERIE COMPUTER, Erie  
JNE COMMUNICATIONS, Altoona  
MAFEX ASSOCIATES, Johnstown  
OMNIFAX, Feasterville  
OMNIFAX, Philadelphia  
PERSONAL COMPUTER CORP., Paoli  
PITTSBURGH COMPUTER STORE, Pittsburg  
STEVENS RADIO SHACK DEALER, Phoenixville  
ROUTE 30 ELECTRONICS, Latrobe  
RUMPELSTILSKIN TOY SHOP, New Hope  
TELEVISION PARTS COMPANY INC.,  
New Brighton

## PUERTO RICO

MICRO COMPUTER STORE, Caparra Terrace

## RHODE ISLAND

COLONIAL ENTERPRISES, Foster

## SOUTH CAROLINA

OMNI ELECTRONICS, Charleston  
**TENNESSEE**  
ACE MINI SYSTEMS, Clarksville  
CHATTANOOGA COMPUTER CENTER,  
Chattanooga  
COMPUTER WORLD, Nashville  
COMPUTERLAB, Memphis

## TEXAS

CODEDATA INC., Arlington  
COMPUSHOP, Bellaire  
COMPUSHOP/FM 1960W, Houston  
COMPUSHOP/FM, Houston  
COMPUTER 'N' THINGS, Austin  
COMPUTER PROGRAMMING ASSOC., Lubbock  
COMPUTER PORT, Arlington  
COMPUTER SALES & SERVICE, Fort Worth  
COMPUTER SOLUTIONS, San Antonio  
COMPUTERLAND OF SW HOUSTON, Houston  
COMPUTERS BY O'NEILL, Lake Jackson  
COMPUTERS TO GO, Austin  
COMPUTEX, Webster  
CORSAIR, Ft. Worth  
GATEWAY ELECTRONICS, Houston  
KA ELECTRONICS, Dallas  
MAC'S TV, Fairfield  
MARYMAC INDUSTRIES (R/S DEALER),  
Houston  
PAN AMERICAN ELECTRONICS (R/S DEALER),  
Mission  
R.L. COLE'S ELECTRONICS, San Antonio  
ROY'S CB & ELECTRONICS, Arkansas Pass  
80 SOFTWARE, San Antonio  
WAGHALTER BOOKS, INC., Houston  
**UTAH**  
COMPUTERLAND, Salt Lake City  
FOOTHILL MODELERS, Salt Lake City  
**VIRGINIA**  
COMPUTER SOLUTIONS, Leesburg  
COMPUTER WORKS, INC., Harrisonburg  
HOME COMPUTER CENTER INC.,  
Virginia Beach  
LITTLE SOLDIER, Alexandria  
SYSTEMS MARKETING, Arlington

## WASHINGTON

AMERICAN MERCANTILE COMPANY, Seattle  
COMPUTERLAND, Bellevue  
COMPUTERLAND, Federal Way  
COMPUTERLAND, Spokane  
EMPIRE ELECTRONICS, Sunnyside  
J.B. SALES, Snohomish  
LORDS, Port Angeles  
UNIVERSITY VILLAGE MUSIC, Seattle  
U.S. ENTERPRISE, Kirkland  
WESTERN MICROCOMPUTER CENTER,  
Bellingham

## WEST VIRGINIA

COMPUTER CORNER, Morgantown  
COMPUTER STORE, Huntington

## OHIO VALLEY ELECTRONIC SYSTEMS,

Wheeling  
SOUND & ELECTRONIC SPECIALTIES,  
Morgantown  
**WISCONSIN**  
BYTE SHOP, Milwaukee  
COMPUTERLAND, Madison  
COMPUTERLAND OF FOX RIVER VALLEY,  
Oshkosh  
COMPUTER WORLD, Green Bay  
MAGIC LANTERN COMPUTER, Madison  
OMEGA MICROS, Milwaukee  
PETTED MICROSYSTEMS, Milwaukee  
S&O TV SALES, Monroe  
**WYOMING**  
COMPUTER CONCEPTS, Cheyenne

## AUSTRALIA

DE FOREST SOFTWARE, Nunawading, Vic.  
**CANADA**

Distributor:  
MICRON DISTRIBUTING,  
Toronto, Ont.

ALLIED COMPUTER CENTRE, Thunder Bay,  
Ontario  
ARKON ELECTRONICS, Toronto, Ontario  
AULL COMPUTER SYSTEMS, Victoria, B.C.  
BITS & BYTES, Dartmouth, N.S.  
CENTRAL DISTRIBUTORS LTD., Lachine,  
Quebec  
COMPUCORNER, Smithers, B.C.  
COMPUART, Ottawa, Ontario  
COMPUTER BARN, Sarnia, Ontario  
AULL COMPUTER SYSTEMS, Victoria, B.C.  
COMPUTER INNOVATIONS, Ottawa, Ontario  
COMPUTER SHOP LTD., Calgary, Alberta  
COMPUTER WORLD, Vancouver, B.C.  
COMPUTERLAND OF BURLINGTON,  
Burlington, Ontario  
CREATIVE COMPUTERS, Victoria, B.C.  
DATATEC COMPUTER SYSTEMS LTD.,  
Saskatoon, Sask.  
ELECTRONICS 2001, Willowdale, Ontario  
GALACTICA COMPUTERS LTD., Edmonton,  
Alberta  
IRISCO DU QUEBEC, Ste. Foy, Quebec  
LYONS LOGIC LTD., London, Ontario  
MICROMATION, Toronto, Ontario  
MICROSHACK, Saskatoon, Sask.  
MICRO SHACK, Regina, Sask.  
M&W COMPUTERS, Mississauga, Ontario  
NIP & TUCK VARIETY, London, Ontario  
OFFICE CENTRE, Kingston, Ontario  
SAULT OFFICE MACHINES, Sault St. Marie,  
Ontario  
STATUS COMPUTER SYSTEMS, St. Catharines,  
Ontario  
TOTAL COMPUTER SYSTEMS, Ajax, Ontario  
WEST WORLD COMPUTERS, Edmonton,  
Alberta  
**ITALY**  
BITS & BYTES, Milan  
**NEW ZEALAND**  
VISICOUNT ELECTRONICS, Palmerston North  
**NORWAY**  
A/S SORLUND, Vedavagen  
**SWEDEN**  
SENTEC AB, Jarfalla  
**UNITED KINGDOM**  
CALISTO COMPUTERS, Birmingham  
THE SOFTWARE HOUSE, London  
**WEST GERMANY**  
MICROSTUFF, Frankfurt  
**NETHERLANDS & BELGIUM**

Distributor:  
SOFTWARE IMPORT BRABANT,  
Eindhoven, Neth.

COMPUTER COLLECTIEF, Amsterdam  
MICRO COMPUTING, Krommenie  
MICRO DYNAMICS, Eindhoven  
MUSICPRINT-CHIP, Arkel  
OVEL GONNE, Drachten  
R.A.L. MICROCOMPUTERS, The Hague

**YOUR NAME COULD  
BE HERE. CALL:  
1-800-258-5473**

## Find out what you're missing.

You heard the lady. Your microcomputing life is going to be very exciting. But don't leave it to chance—leave it to us! We have a brand new catalog full of packages and valuable coupons to help make it happen. It's free . . . if you fill out the coupon and mail it today. (Or make a photocopy and spare your magazine).

NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

CITY: \_\_\_\_\_

STATE: \_\_\_\_\_

ZIP: \_\_\_\_\_

**Instant Software™ Inc.**

Peterborough, N.H. 03458 603-924-7296 -A18



---

*To stem the tide of rising paperwork, an Apple was installed in this doctor's office and cut down on the time and expense involved in patient care.*

---

# Microsystems for the Dental/Medical Office

By E.J. Neiburger

**W**hen I began my dentistry practice in 1968, maintaining the office was a simple task. Insurance was not yet common—patients paid cash or made weekly payments. I had one staff member, who helped me at chairside, cleaned instruments, made appointments, wrote out bills (40 a month) and vacuumed the rugs. I practiced dentistry 90 percent of the time with a 70 percent profit/expense margin.

Thirteen years later, my staff is up to seven—most of whom push insurance forms (400 monthly) and billing statements. I practice dentistry 60 percent of the time, reserving the other 40 percent for red tape. My profit/expense margin has dropped to 47 percent.

My situation is not unique in medicine. While new technical developments allow great productivity, paperwork has grown exponen-

tially. A family of four alone can require up to 48 insurance forms (pre-authorization and billing forms in triplicate) for one office visit. Keeping track of payments, accounts receivable and unpaid bills takes up an increasing amount of time and expense.

These paperwork problems are aggravated by the fact that fees are often adjusted according to the income level of the patient. Furthermore, payment frequently involves a third party, such as an insurance company or welfare. Keeping track of these factors and educating the patient can be time-consuming and expensive.

Also, taxes and a host of federal, state and local regulations require the doctor to process increasingly more forms. Unemployment insurance, disability, workmen's compensation, payroll taxes—all contribute to mounds of extra paperwork and staff.

Most offices are quite efficient using manual methods—photocopy machines, pegboard logs, colored indexes and a reliable staff. But as the practice grows, the doctor must devote more and more time to management. At this point, it's time he consider computerizing his office.

## Enter Apple II

After much shopping, we bought an Apple II with 32K bytes of memory. It took up little space and was quiet; it had sound, color, high-resolution graphics and a TV interface, and could be upgraded easily. It was also less expensive than other systems.

Eventually, we upgraded it to 48K bytes of programmable random-access memory (RAM) with one, and later two, disk drives. A year later we added a Corvus 10-megabyte hard disk system. We also switched from a low-resolution TV to a nine-inch, and then a 12-inch, monitor.

When loading times proved inconvenient, we bought several more Apples and dedicated them to different operations. This multiprocessing arrangement gave us minicomputer-like power at a fraction of the usual cost. We paid \$13,700, while a comparable mini system—without such features as sound, color, graphics tablet, light pen and A/D board—would have run \$50,000. We're now working on multiplexing the system, so that each computer can operate all peripherals independently. (See "Multiprocessor vs. Multitask" by Ken Barbier, June 1981 *Microcomputing*, p. 34.)



*Apple II computer with large screen monitor and appointment program.*

---

*Address correspondence to E.J. Neiburger, Dental Computer Newsletter, 1000 North Ave., Waukegan, IL 60085.*

---



The most important factor for any system is software. Fortunately, we've found some that meets our most critical needs.

The most time-consuming and costly portion of dental practice is handling insurance. We use an insurance form word processor called Dental Insurance Form Writer. It lets us edit and print master insurance forms for each family. As treatment progresses, services and fees are entered and insurance forms printed out on the same day. Lost forms (an epidemic on the increase at insurance companies) are no problem—a duplicate can be loaded from disk and printed with the touch of a key. Preauthorizations can be created and altered as treatment continues, and then printed and mailed.

This program helps reduce the cost of processing insurance forms from \$1 (eight minutes of staff time) to 40 cents (three minutes) per form, and allows same-day submittals of forms. This reduces accounts receivable and speeds insurance payments to our patients. Before computers, we processed about 30 forms a day at a cost of \$1 a form. We were usually three days behind. Computers reduced costs (after the debugging process) by about 60 percent, thus saving \$3100 in labor per year. And mailings are done on the day of service, speeding up payments by one week.

In our credit economy, most patients want to be billed. Our old manual system took two staff members six hours each per month. Much of this time was spent computing interest charges on unpaid accounts. Interest Print, a short billing program, helped reduce billing time to four staff hours; it saves us \$2500 per year in salaries and has lowered accounts receivable.

Most offices get along well with a simple appointment book and pencil. Problems occur when the daily appointment load exceeds 30 patients. Constant cancelling, rescheduling, erasing and searching for forgetful patients' appointment times result in delays, errors and over or underbooking. An out-of-control appointment book is a prime source of office stress.

Instead, we use the Appointments program, a user-definable program that converts the Apple into an electronic appointment book. Each patient is given a convenient time slot. Days can be scrolled backward and forward using the arrow keys. There are full editing functions, day sheet and printout modes. The search function allows rapid searches for appointments of forgetful patients.

The program has saved us at least two staff hours per day (\$3600 per year), while controlling our appointments and giving us a steady patient load.

The most distressing problem encountered in the doctor's business office is misplaced records. The average dentist has 2000 active and 4000 inactive patients. Since each patient has an ever-increasing file, a tremendous volume of paper accumulates. Records must be pulled and refiled for each treatment and billing transaction. A misplaced file creates delays, lost insurance benefits and postponed treatment.

We use a patient-record program created from a database management program. Each patient record contains the following categories (fields):

- Name
- Address
- Phone
- Medical History
- Amount Owed

#### ● Remarks

A patient's record can be created, edited or deleted. The entire file can be sorted alphabetically or searched by any field. Periodic searches for the field Amount Owed creates a billing or accounts-receivable file. It takes only a moment to retrieve a patient's phone number or print a mailing label or referral list.

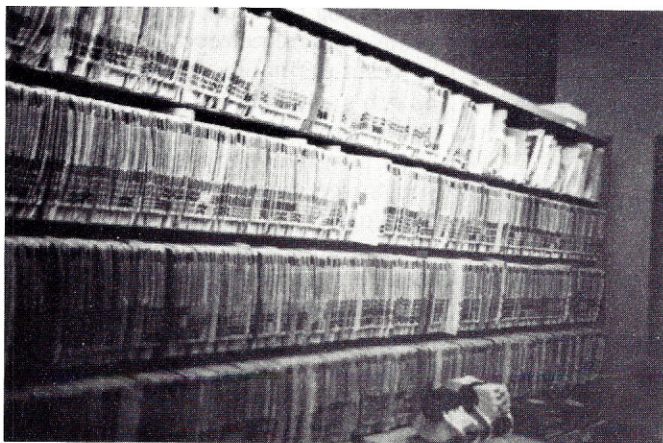
This type of program can also be used with other lists. With a computer we can keep up to date with the 108 insurance carriers that serve our patients. Not only is it easier to educate our patients about their insurance benefits, but they feel they are obtaining the maximum benefits from their dental plans.

About ten years ago prevention became the watchword of dentistry (and medicine). The usual dental checkup is every six months and people tend to forget these long-term appointments. It is expensive and time consuming to search through card files and make up recall post cards.

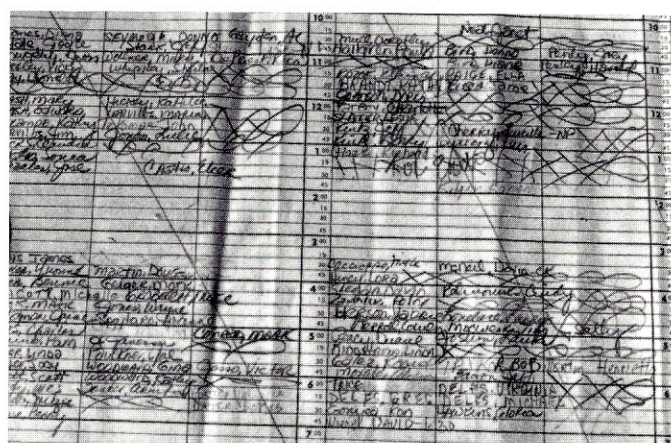
A computerized recall file can be made from a database management program. It will automatically produce recall lists (name, address, phone) for those who are due for an exam and cleaning. Overdue individuals can be reminded of their visit. The recall file contains the fields:

- Name
- Address
- Phone
- Last Visit
- Next Visit
- Remarks

The program will select patients on the basis of the Next-Visit field. When setting up appointments for the next month, the system will sort and print a list of all people who should be seen. Labels are then printed and



Bulky paper patient files.



Appointment log—messy, crowded and hard to read.



placed on post cards. This process can save at least one hour of secretary time per day.

One of the first programs I used when I computerized was the word processor, Applewriter. The dental/medical office has ample need for personalized mass mailings. Collection letters, letters thanking individuals for referrals, welcome-to-our-practice letters and treatment instruction/information sheets aid in normal business activities. Reports to insurance companies as well as usual business communication to suppliers, labs and governmental agencies are also needed.

The amount of secretarial time saved and the improved public image created by original rather than photocopied form letters and information sheets make word processing essential for any office.

A program that will print labels is a small investment and a great convenience. With Label Writer, we print several batches of pressure-sensitive labels for each insurance company to which we submit forms. This saves one minute per letter, 40 letters per day. Labels with warning signs (al-

lergy warning, medical alerts, credit status) are placed on the outside of patient records for rapid viewing. These and several other uses of printed labels can save the doctor's

American Dental Association universal insurance form—almost an industry standard.

and secretary's time.

## Other Computer Uses

●The computer need not lie idle at the end of the day. It can watch the office. The Apple Alarm program uses the Apple II's game paddle ports as inputs for floor mat and window alarms. The computer will register the times and activate alarms or a modem if the office is entered. (We now know what time the janitor works and when other employees arrive or leave the office.) Since several sensors must be triggered to activate the burglar alarm, there are no false alarms.

Patient/appointment records are the most valuable part of any practice. Their destruction by fire or theft can create a financial loss of disastrous proportions. Not only would the doctor lose valuable financial records, but the history of each patient's treatment and diagnostic tests would be compromised. Computers can make rapid backup copies on tape or floppy disk that can be kept off the premises for safety and duplication.

●The most common prescriptions written for dentistry are for antibiotics and pain medications in standard doses. It is helpful to have a small number of preprinted prescription forms for such medicines. Prescription Form Writer is a short program that creates any number of prescription forms. In the past we had a professional printer process several thousand prewritten forms; this was expensive and created a storage problem and theft risk. The program will print several dozen prescription forms on plain paper, when we need them and at a negligible cost.

●Super Checkbook is an excellent program that keeps track of our expenses (checks and deposits). It will keep a log of disbursements and income, and create reports of expenses by user-definable categories. Each month's expenses can be graphed and compared to preceding periods. This program very quickly allows you to see where your expenses are heading.

●Computing payroll for more than three employees takes time. A short payroll program that is upgradable (to new law requirements) and computes federal, state and Social Security taxes is helpful and saves several hours each month.

●There are several medical/dental computer bulletin boards (CBBs) and

## New Software for NorthStar Users

### EXPENSE PROFILE

- Find out where your money goes! Summarize expenses by use and user.
- Simplify tax preparation. Calculates tax deductibles for each family member separately. Easy JOINT vs SEPARATE RETURN comparisons.
- Menu Driven. Interactive Input. Add new spending categories and spenders any time. Find records by searching for any part of line, e.g. "car".
- Correct mistakes anytime. Change wrong data only; not the whole line.
- Records stored on disc. Limited only by disc capacity. Output to TV or printer.

**\$29.95** ppd

### DYNAMIC BUDGET

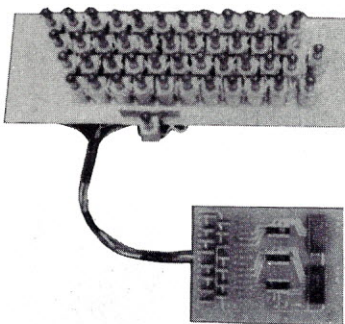
- Wonder if you can afford that new printer or boat or ?? Find out with DYNAMIC BUDGET I
- Easy Input. Periodic items like salary and rent are entered only once, even if periods are in weeks, quarters, etc.
- Includes INFLATION and CALENDAR.
- Output to printer or TV. Monthly listings of expenses and income. Calculates running balance.
- Interactive. Change data anytime and get new results immediately.
- Data stored on disc. Makes keeping budget up to date easy.

**\$29.95** ppd

The Software Connection  
Dept KB 302 10703 Meadowhill Rd.  
Silver Spring, MD 20901

## Letter Quality Printer

Put your favorite electric typewriter to work.



Build "Tillie the typing robot". Full parts kit, Instructions and Z-80 software source listing.

**\$260**

CALIFORNIA RESIDENTS  
6% SALES TAX

PRICES SUBJECT TO CHANGE WITHOUT NOTICE.

Send stamped self addressed envelope for brochure.

Mason Electronics 218  
21203 A Hawthorne Blvd. • Suite 5053  
Torrance, California 90503



by which you can "converse" with colleagues, using a modem and appropriate software. Also, over 300 general computer bulletin boards allow free access for information and advertising. New staff members, programmers and used equipment can often be located by use of CBBSeS.

Service networks such as The Source or CompuServe supply a host of news, scientific and investment options for a small fee. Data on weather, news, nutrition analysis, food menus, banking, investments and precious-metal prices can be assessed.

Many insurance companies and suppliers are accepting modem-transferred insurance forms (e.g., Blue Cross). This speeds processing by avoiding the mail and key punching delays of manual forms. Treatment authorizations and billing, computer banking and other financial transactions speed payments and patients' treatment.

●Several programs will allow your computer to interpret lab reports, identify drug interactions and give differential diagnosis and prognosis statistics. The time-consuming calculations that a dentist must make from X-rays in order to plan orthodontic treatment can be quickly done using a graphics tablet.

●Patient education is an important aspect of prevention. Programs that teach the patient can aid the doctor in treatment. Heart Attack Test, Life-line, Teeth and many other programs educate the patient about potential disease circumstances. The patient can learn about progressive gum dis-

ease or decay or how modification of life style affects longevity. Such programs allow the doctor to spend more time with the patients on treatment specifics and individual problems.

Professional education is also enhanced. The Millikin System is a series of 73 tutorial programs on various medical specialties. Encephalon by G. Banks uses graphics to simulate patient reaction during neurological examination. Control Data's new CP/M-based Micro System uses the extensive PLATO system library for general specialty training.

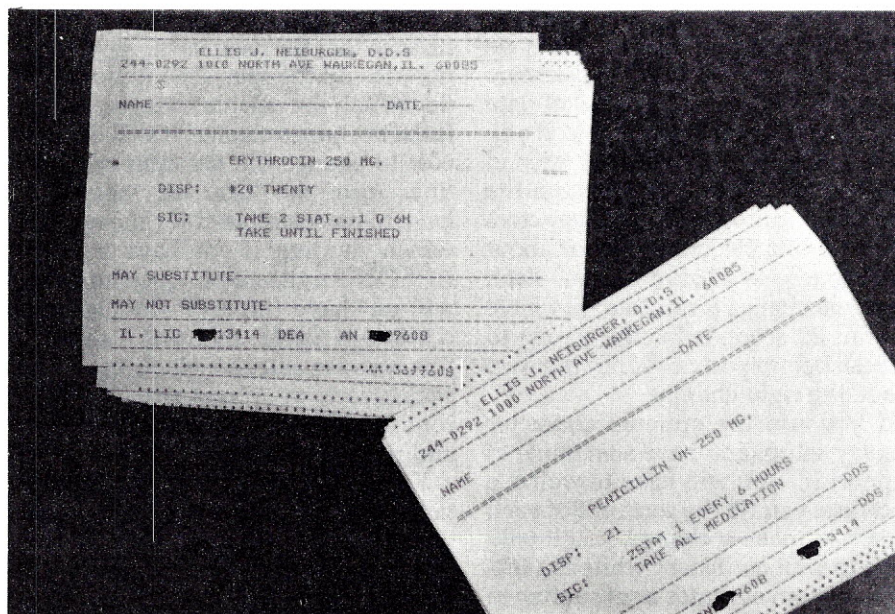
Doctors can learn when convenient, and do this without traveling or closing their offices. Errors in treatment need only influence computer simulations, not actual patients.

## Summary

The dental/medical practice has unique problems that can be alleviated by computers. Appointments, insurance, billing, patient records, payroll and the like are becoming serious problems in manually run offices. Since 90 percent of most problems occur in select areas of the practice, a small computer system is ideal.

A microcomputer system allows the partial computerization of operations that the doctor cannot control by manual means. It gives the practitioner more control at less cost in time and money for the patient, the staff and the doctor. ■

*Questions concerning the availability of the programs mentioned in this article should be addressed to the author, along with an SASE.*



Preprinted prescription forms—a great savings in time.

See List of Advertisers on page 210

# ELCOMP BOOKS and SOFTWARE

For ATARI - PET/CBM - OSI - 6502

## 8K Microsoft BASIC Reference Manual

Authoritative reference for the original Microsoft 4K + 8K BASIC developed for Altair and later computers including OSI, PET and TRS-80.

Order-No. 141 \$9.95  
Expansion Handbook for 6502 and 6802

S-44 Card Manual describes all of the 45 x 6.5 44-pin S-44 cards incl. schematics. A MUST for every KIM-, SYM- and AIM-owner.

Order-No. 152 \$9.95  
Microcomputer Application Notes

Reprint of Intel's most important application notes including 2708, 8085, 8255, 6251 chips. Very necessary for the hardware buff.

Order-No. 153 \$9.95  
Complex Sound Generation

New revised applications manual for the Texas Instruments SN 76477 Complex Sound Generator. Circuit Board available (\$8.95).

Order-No. 154 \$6.95  
Small Business Programs

Complete listings for the business user. Inventory, Invoice Writing, Mailing List and much more. Introduction to Business Applications.

Order-No. 156 \$14.90  
The First Book of Ohio Scientific

Introduction to OSI computers. Diagrams, Hardware and software information not previously available in one compact source. 192 pages.

Order-No. 157 \$7.95  
The Second Book of Ohio Scientific

Very valuable information about OSI microcomputer systems. Introduction to OS-65 D and OS-65U Networking. Hardware and Software hints and tips. Systems specifications. Business applications.

Order-No. 158 \$7.95  
The Fourth Book of OHIO

Very Important Programs Many interesting programs for OSI computers. Sorting (Binary Tree), Differential Equations, Statistics, Astrology, Gas Consumption, Games a.s.o.

Order-No. 160 \$9.95  
VIP Package

Above book plus a cassette with the programs.

Order-No. 160 A \$19.95  
Invoice Writing Program for

OSI-C1PMF, C4P, Disk and Cassette, 8K RAM.

Order-No. 8234 \$29.80  
Mailing List for C1PMF or

C4PMF 24K RAM 250 addresses incl. phone number and parameters on one 5 1/4" Disk

Order-No. 8240 \$29.80

Programs for the Challenger

C1/C2 8K

Order-No. 2004 "Bare Bones" Wordprocessor \$9.95

Order-No. 2005 "Bare Bones" Mailing List \$9.95

Care and Feeding of the Commodore PET

Eight chapters exploring PET hardware. Includes repair and interfacing information. Programming tricks and schematics.

Order-No. 150 \$9.95

ELCOMP Publishing, Inc.

53 Redrock Lane, Pomona, CA 91766

Phone: (714) 623-8314

Payment: Check, Money Order, VISA, Mastercharge, Eurocheck

POSTPAID or PREPAID in USA. \$ 5.00 handling fee for C.O.D.

All orders outside USA. ADD 15 % shipping. CA add 6 % sales tax

ATARI is a registered trademark of ATARI INC.

PET/CBM is a registered trademark of Commodore Business.

## Important Software for CBM 16K/32K

Most powerful Editor/Assembler for Commodore CBM 16/32K on cassette. Assembler can be started directly from editor or from the TIM-Monitor. Translates in three passes. If an error is encountered, automatic return to the editor. Cassette with DEMO.

Order-No. 3276 \$39.00  
MONJANA/1 Makes Machine

Language Programming Easy! In every Commodore CBM there is a spare ROM socket waiting for it's MONJANA/1.

The new MONJANA/1 Machine Language Monitor in ROM offers more user guidance and debugging aids than any other monitor available today. Comprehensive manual included.

Order-No. 2001 \$49.00  
SPECIAL PRICE JANA-Monitor on Cassette for the PET. Similar to MONJANA/1. Very powerful.

Order-No. 2002 \$19.95  
Programming in Machine Language with the Commodore PET

This book includes EDITOR/ASSEMBLER, MONJANA, JANA, EDITOR, ASSEMBLER, LINKER and DISASSEMBLER, HEXDUMP and complete descriptions of the programs.

Order-No. 165 \$19.95  
BLANK CASSETTES

High Quality C-10 cassettes Blank Cassettes (Quantity 10)

Order-No. 8005C \$4.99  
ATARI OWNERS TAKE NOTE:

ATARI-BASIC - Learning by Using

A new book with programs and learning exercises. Many of the programs are appropriate for beginners as well as experienced computer users. (Screen Drawings, Special Sounds, Keys, Paddles + Joysticks, Specialized Screen Routines, Graphics and Sound, Peeks and Pokes and special stuff).

Order-No. 164 \$9.95  
ATMONA-1 Machine Language Monitor for the ATARI 400/800

This powerful monitor provides you with the firmware support that you need to get the most out of your powerful system. ATMONA-1 comes on a bootable cassette. No cartridges required. Disassemble, Memory Dump HEX + ASCII, (Change Memory Locations, Blocktransfer, Fill memory block, Save and Load Machine Language Programs, Start Mach. Lang. Progr. (Printer Options)).

Order-No. 7022 \$19.95  
ATMONA-2 Supersteper

A very powerful Tracer to explore the ATARI ROM/RAM area. Stop at previously selected address, Opcode or operand.

Order-No. 7049 (includes ATMONA-1) \$49.95  
EDITOR/ASSEMBLER for ATARI 800, 32K RAM

Extremely fast and powerful Editor/Assembler. (8K Source code in about 5 seconds) includes ATMONA-1.

Order-No. 7098 \$49.95  
MACRO-Assembler for ATARI-800, 48K RAM

Order-No. 7099 \$99.00



# Focus In on Your Financial Picture

By Jim Shreeve

**T**his simulation program lets you input financial information and predict what's going to happen in the future.

The program is simple, and can be customized to suit your personal or small-business needs. You put the essential facts on a cassette or disk, so they don't have to be reentered every time you run the program. You can adjust your data to fit different options in your present situation, thus giving you a basis for deciding just how much a change will make to your financial picture any number of years down the road.

The program includes the following features:

- It calculates mortgage payments.
- It calculates taxes and insurance for your home.
- It figures value of your home over the coming years.
- It gives a tax break on home payments for your tax bracket.
- It includes the cost-of-living increase over the years.
- It shows income increases each year.
- It weighs cost of living against income.
- It figures income taxes from gross pay.
- It shows take-home pay.
- It makes square footage estimates on new homes.
- It is expandable to cover other variables.

Keep in mind that a simulation program bases its projections on facts only. It cannot take into account a natural catastrophe or a raise in taxes. It is only as reliable as the facts you originally supply it.

This program runs under MSI Extended Disk BASIC. I have used traditional commands, so it should be easy to convert to your own BASIC.

The only problem you may have is with a special subroutine to provide screen clearing and cursor placement for my terminal. I have a standard subroutine located at lines 9900 to the end of the program that builds character sets that output the proper control characters to my Heathkit H19 terminal. The H19 uses two-character escape sequences to control it. I merely build these into strings in the subroutine at 9900; then all that's left is to print the strings to the terminal to get the effect wanted.

The screen of your terminal will fill up with data each time you make a correction to the data on the screen. If your terminal is fast or has a small display area (like a 32×16), it is okay as is. If you have a large display like an 80×24 or if you run at a slow speed (below 1200 bits per second), you may want to use the alternate display routine that uses X,Y positioning on the screen to fill in the data.

Here is what happens: in the example of the 80×24 display you have 1920 characters to fill the screen. Since the screen is nearly full of data with the program the way it is, if you are running at 300 bits per second and estimate 1000 characters on the screen, it will take 1000 characters times 10 bits per character, or about 33 seconds, to fill the screen. Each time you change a variable, you have to wait 30 seconds for the screen to refresh before you can verify that you made the right change.

If you use the optional character display setup (and have a terminal to support it), you will have to wait the first time you fill the screen. But each time you make a change, you'll only have to wait an instant while the BASIC program executes a subroutine to place the new data in the right place on the screen. If your computer has

cursor positioning built right into the BASIC program, you'll be able to simplify the alternate routine considerably.

## Organization of Program

The program is organized into three areas. First is data gathering, which works with the incoming facts file and interacts with the keyboard. Second is data processing, where the facts gathered are used to arrive at such things as total taxes and expenses. Third is the screen display of the data originally entered.

Part of the data-out portion of the program updates the data from the files to contain the information entered by the operator during data gathering. This means that each running of the program will start with the values used in the last running of the program. This is what gives the program its ease of use with so many variables.

Data processing is done in subroutines so that the user can make alterations to suit the special conditions under which the calculations are made. If the tax tables change, it will be simpler to change the tax table subroutine. Also, the local tax table will have to be customized for the area in which you live. If you have to enter AUSTIN for the city in question, you will not have the right tax base for NEW ORLEANS. By using a subroutine, you are able to include any taxes exclusive to your area too. The subroutine eliminates messing with data and read statements.

You may use the tax table information on property taxes as given to get you started, but you'll want to get

---

*Address correspondence to Jim Shreeve, 8102 Wexford, Austin, TX 78759.*

---



your own local tax tables entered into the program. It is not hard to collect the data: just call a local real estate office, tell them what you're doing and ask for the tax bases and insurance rates. They'll give you a rate per thousand dollars evaluation for local, county and state (if any). Some places will have special education taxes also. You plug those into the subroutine for taxes on property starting at line 9200.

There are some other facts plugged into the program that may be exclusive to your area. One of these is square footage calculations. The factors used in this program are about the national average but they may vary for homes in your area. Again, the local real estate agent can give you the three ranges for square footage of homes in your area. Program lines 8200-8230 contain the square footage subroutines. Note that a low-priced house sells for around \$35 per square foot while a high-priced home sells for in the neighborhood of \$45 per square foot. Supposedly, the extra \$10 per square foot pays for higher-quality fixtures and better workmanship, along with a nicer lot in a so-called better neighborhood. You will learn a lot about real estate values in your area just by customizing this program.

### Details of the Program

The program actually consists of two programs: a short one to set up the files with initial values to get the whole thing running and one I've already discussed. Listing 1 is the main program. Listing 2 is the file-building program. Listing 3 is that part of the program to be used when you don't want to wait for the screen to refresh between entries. Remember that Listing 3 requires a terminal capable of accepting cursor position information. Begin by referring to Listing 1.

**Data gathering**—The listing shown spends its first lines (100-490) setting up the BASIC interpreter for string and line length and describing the program. The REM statements can be left out when they will use up too much memory. Otherwise, remarks provide a built-in refresher for users who will put this program away and then need to remember how to use it in coming months.

From 500 to 550, you're simply getting the files from the disk (or cassette). These are the initial values that will be used to show up on the screen as the program is started. They are the values left over from the last pro-

Listing 1. Main Personal Finance program in MSI Extended Disk BASIC.

```

0100 REM -----
0110 REM This program is a real life financial condition simulator which
0120 REM can simulate your finances for a selected number of years. The
0130 REM program was written expressly to aid in making decisions per-
0140 REM taining to the purchase of a home. The program is simply adapt-
0150 REM able to the tax and insurance base in your area just by changing
0160 REM a few of the lines of code.
0170 REM
0180 REM The program needn't be changed in some cases because the tax
0190 REM structure for the communities used in this program may be sim-
0200 REM ilar to those in your area.
0210 REM
0220 REM Presently some of the codes are only stored (capital assets and
0230 REM similar things) you may leave these out, but the fact that they
0240 REM are stored on disc may in itself prove handy.
0250 REM Basically the program covers the following things:
0260 REM * Price of home under consideration
0270 REM * Size of downpayment
0280 REM * Inflation rate
0290 REM * Income
0300 REM * % Average pay raises
0310 REM * Costs of living
0320 REM * Square footage calculations
0330 REM * Appreciation rate of home in %
0340 REM
0350 REM The program inputs are easily changed. Its outputs provide the
0360 REM following information for the number of years specified:
0370 REM * Salary breakdown (take home pay)
0380 REM * House payment (including taxes and insurance)
0390 REM * Deduction of fixed expenses
0400 REM * Appreciated value of house
0410 REM * Tax break value of house
0420 REM
0430 REM -----
0470 DIGITS= 2
0480 STRING= 80
0490 LINE= 132
0500 OPEN #10 , "CARRAGE" FOR UPDATE
0510 OPEN #20 , "MORGAR" FOR UPDATE
0520 FIELD #10,A=9,B=4,C=4,D=6,F=1,G=2,H=4,J=6,K=5,L=4,M=1,N=9,P=10,W=9
0530 FIELD #20, X4=6,X5=6,X6=6,X7=9,A$=16,C1=4
0540 GET #10
0550 GET #20
0560 GOSUB 9900
0570 LET E=1
0580 PRINT X$(4);E;" SALARY $" ;A
0610 E=E+1 :PRINT E;" % PAY RAISES " ;B
0620 E=E+1 :? E;" TAXED AS " ;
0630 IF M=1 THEN PRINT "NOT " ;
0640 PRINT "MARRIED"
0650 E=E+1 :PRINT E;" OTHER INCOME PER ANNUM " ;W
0655 PRINT
0660 E=E+1 :PRINT E;" INFLATION RATE PER ANNUM " ;C
0670 E=E+1 :PRINT E;" PRICE OF FOOD PER MONTH " ;X4
0680 E=E+1 :PRINT E;" COST OF UTILITIES PER MO. " ;X5
0690 E=E+1 :PRINT E;" CAR EXPENSES INCLUDING PAYMENT PER MO. " ;X6
0700 E=E+1 :PRINT E;" ALL OTHER COSTS PER MONTH " ;X7
0710 PRINT
0720 E=E+1 :PRINT E;" CASH ASSETS " ;N;
0730 E=E+1 :PRINT TAB(40);E;" HARD ASSETS " ;P
0740 E=E+1 :PRINT E;" VALUE OF CAR " ;K
0750 PRINT
0760 E=E+1 :PRINT E;" PRICE OF HOME " ;D;
0770 E=E+1 :PRINT TAB(40);E;" DOWNPAYMENT " ;J
0780 E=E+1 :PRINT E;" THE HOME IS " ;:IF F=1 THEN PRINT "USED "
0790 IF F=2 THEN PRINT "NEW" :GOTO 800
0795 PRINT
0800 E=E+1 :PRINT E;" MORTGAGE INTEREST RATE " ;L;
0810 E=E+1 :PRINT TAB(40);E;" SQ. FT. OR VAL RANGE 1,2,3 " ;H
0815 PRINT
0820 E=E+1 :PRINT E;" NUMBER OF YEARS TO REPORT " ;G
0822 E=E+1 :PRINT E;" APPRECIATION % " ;C1
0825 LET B$="ENTER NUMBER OF SELECTION, ENTER -DONE- TO EXIT ROUTINE"
0830 GOSUB 9800 :? X$(6);TAB(10);
0840 PRINT TAB(10);B$;TAB(45);X$(3);X$(7);
0850 LET X=1;Y=24
0860 GOSUB 9900
0870 PRINT X$(2);"EJ";
0880 INPUT B$
0885 IF B$="" THEN 850
0890 IF B$="DONE" THEN GOTO 1000
0900 LET E=VAL(B$)
0910 IF E>11 THEN 940
0915 IF E<1 THEN 850
0920 ON E GOSUB 8010,8020,8030,8040,8050,8060,8070,8080,8090,8100,8110
0930 GOTO 560
0940 LET E=E-11
0945 IF E>8 THEN 850
0950 ON E GOSUB 8120,8130,8140,8150,8160,8170,8180,8300
0960 GOTO 560
1000 PRINT "IF TOWN IS " ;A$;" HIT RETURN, ELSE ENTER TOWN";
1002 INPUT B$
1003 IF B$="" GOTO 1010
1005 LET A$=B$
1010 REWRITE #20
1015 REWRITE #10
1020 LET U=D
1030 PRINT X$(9);X$(4);
1050 LET S=0
1060 GOSUB 9200

```

More →



# Now with added words!\*

## ELECTRIC MOUTH



ELF II VERSION

for \$100, Elf II, Apple  
TRS-80, Level II\* From **\$99.95** kit

**Now — teach your computer to talk,  
increasing interaction between you  
and your machine.**

That's right: the ELECTRIC MOUTH actually lets your computer talk! Installed and on-line in just minutes, it's ready for spoken-language use in office, business, industrial and commercial applications, and in games, special projects, R&D, education, security devices — there's no end to the ELECTRIC MOUTH's usefulness. Look at these features:

- Supplied with 143 letters/words/phonemes/numbers, capable of producing hundreds of words and phrases.
- Expandable on-board up to thousands of words and phrases with additional speech ROMs (see new speech ROM described below).
- Four models, that plug directly into \$100, Apple, Elf II and TRS-80 Level II computers.
- Get ELECTRIC MOUTH to talk with either Basic or machine language (very easy to use, complete instructions with examples included).
- Uses National Semiconductor's "Digitaltalker."
- Includes on-board audio amplifier and speaker, with provisions for external speakers.
- Installs in just minutes.

**Principle of Operation:** The ELECTRIC MOUTH stores the digital equivalents of words in ROMs. When words, phrases and phonemes are desired, they simply are called for by your program and then synthesized into speech. The ELECTRIC MOUTH system requires none of your valuable memory space except for a few addresses if used in memory mapped mode. In most cases, output ports (user selectable) are used.

### SPOKEN MATERIAL INCLUDED (Vox I)

one	eighteen	at	dollar	inches	number	ss	c	t
two	nineteen	cancel	down	is	of	second	d	u
three	twenty	case	equal	it	off	set	e	v
four	thirty	cent	error	kilo	on	space	f	w
five	forty	400hertz	tone	feet	left	out	speed	g
six	fifty	80hertz	tone	flow	less	over	star	h
seven	sixty	20ms silence	fuel	lesser	parenthesis	start	i	z
eight	seventy	40ms silence	gallon	limit	percent	stop	j	
nine	eighty	80ms silence	go	low	please	than	k	
ten	ninety	160ms silence	gram	lower	plus	the	l	
eleven	hundred	320ms silence	great	mark	point	time	m	
twelve	thousand	centi	greater	meter	pound	try	n	
thirteen	million	check	have	mile	pulses	up	o	
fourteen	zero	comma	high	milli	rate	volt	p	
fifteen	again	control	hour	minute	ready	a	r	
sixteen	ampere	danger	degree	in	near	right	b	s
seventeen	and							

### ADDITIONAL VOCABULARY NOW AVAILABLE (VOX II)

abort	complete	fifth	light	put	station
add	continue	fire	load	quarter	switch
adjust	copy	first	lock	range	system
alarm	correct	floor	longer	reached	temperature
alert	crease	fourth	more	receive	test
all	"de"	forward	move	record	"th"
ask	deposit	from	next	reverse	thank
assistance	dial	gas	no	red	third
attention	door	get	normal	repair	this
blue	east	going	north	repeat	turn
brake	"ed"	green	not	replace	under
button	emergency	hale	notice	room	use
buy	enter	heat	open	safe	waiting
call	entry	hello	operator	second	warning
called	"er"	help	or	secure	was
caution	"eth"	hurts	pass	select	water
celcius	evacuate	hold	per	send	west
centigrade	exit	hot	power	service	wind
change	fail	in	press	side	window
circuit	failure	incorrect	pressure	slow	yellow
cigar	fahrenheit	intruder	process	slower	yes
close	fast	key	pull	smoke	zone
cold	faster	level	push	south	

\*Registered Trademarks

Continental U.S.A. Credit Card Buyers Outside Connecticut

### TO ORDER

Call Toll Free: 800-243-7428

To Order From Connecticut, or For Technical Assistance, call (203) 354-9375

**NETRONICS R&D LTD.**  
333 Litchfield Road, New Milford, CT 06776

Dept K8

Please send the items checked below:

- ☐ \$100 "Electric Mouth" kit w/Vox I ..... \$ 99.95
- ☐ Elf II "Electric Mouth" kit w/Vox I ..... \$ 99.95
- ☐ Apple "Electric Mouth" kit w/Vox I ..... \$119.95
- ☐ TRS-80 Level II "Electric Mouth" kit w/Vox I ..... \$119.95
- ☐ VOX II (Second Word Set) ..... \$ 39.95

Add \$20.00 for wired tested units instead of kits. VOX II postage & insurance \$1.00, all others \$3.00 postage and insurance. Conn. res. add sales tax.

Total Enclosed \$

☐ Personal Check ☐ Cashier's Check/Money Order

☐ Visa ☐ Master Charge (Bank No. \_\_\_\_\_)

Acct. No. \_\_\_\_\_ Exp. Date \_\_\_\_\_

Signature \_\_\_\_\_

Print Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_ Zip \_\_\_\_\_

Listing 1 continued.

```

1070 IF S=0 THEN LET A$="AUSTIN" : GOTO 1050
1075 LET A=A+W
1080 ON M GOSUB 9000,9100
1090 LET R=A*.0613
1100 PRINT X$(4);TAB(35);"DETAILS FOR YEAR ";
1120 PRINT
1130 PRINT "INCOME ";A/12;" FICA ";R/12;" FED ICT ";Q/12;
1140 LET X1=A/12-(R+Q)/12 :PRINT " TOT ";X1
1150 PRINT :PRINT
1160 PRINT "PAYMENT ";T1;" TAXES & INS ";S;" TOT ";
1170 LET X2=T1+S :PRINT X2
1175 PRINT
1180 PRINT "ADD IN FOOD ";X4;" AND UTIL ";X5;" AND AUTO ";X6;
1190 PRINT "OTHER ";X7;" TOT ";
1200 LET X8=X4+X5+X6+X7 :PRINT X8
1205 LET D=D+D*(C1/100)
1210 PRINT :PRINT TAB(50);"VAL OF HOUSE ";D
1220 LET X9=X1-(X2+X8)
1230 PRINT "GRAND TOTAL MONTHLY ";X9
1231 LET I=A : LET A=A-(X2*12)
1232 LET Z=Q : ON M GOSUB 9000,9100
1235 LET Q=Z-Q : PRINT "TAX BREAK ";Q : LET Q=Z
1237 LET A=I
1240 PRINT
1245 PRINT "ENTER [BAK] to go back and change parameters"
1250 PRINT "ENTER [NXT] for next years look at stuff"
1260 PRINT "ENTER [STP] to stop program"
1270 INPUT "WHICH ENTRY",B$
1280 IF B$="STP" THEN CLOSE #10:CLOSE#20: END
1290 IF B$="BAK" THEN CLOSE #10:CLOSE #20:GOTO 500
1300 REM DATA UPDATER
1305 LET X2=X2*12
1310 FOR E=1 TO G
1340 LET A=A+(B/100)
1350 ON M GOSUB 9000,9100
1360 LET R=.0613*A
1370 LET X1=A-(R+Q)
1390 PRINT "TOTAL INCOME NET ";X1
1400 PRINT "TOTAL ON HOUSE ";X2
1410 LET X8=X8+X8*(C/100)
1420 PRINT "TOTAL EXPENSES ";X8*12
1425 LET X9=X1-(X2+X8*12)
1430 PRINT "TOTAL " ";X9
1435 GOSUB 1500
1440 NEXT E
1450 STOP
1460 GOTO 1245
1500 LET I=A
1510 LET A=A-X2
1515 LET Z=Q
1520 ON M GOSUB 9000,9100
1530 LET Z=Z-Q
1540 GOSUB 1600
1550 PRINT "TAX BREAK ";Z
1555 PRINT :PRINT
1560 LET A=I
1570 RETURN
1600 LET D=D+D*(C1/100)
1610 PRINT TAB(40);"VALUE OF HOME ";D
1620 RETURN
8000 REM REPAIR SUBROUTINES
8010 INPUT "SALARY ",A
8015 RETURN
8020 INPUT "% PAY RAISES ",B
8025 RETURN
8030 INPUT "1-IF SINGLE 2-MARRIED",M
8035 RETURN
8040 INPUT "OTHER INCOME",W
8045 RETURN
8050 INPUT "INFLATION RATE IN %",C
8055 RETURN
8060 INPUT "FOOD (MONTHLY) $",X4
8065 RETURN
8070 INPUT "UTILITIES (MONTHLY) $",X5
8075 RETURN
8080 INPUT "AUTOMOTIVE COSTS GAS,PAYMENT,ALL (MONTHLY) $",X6
8085 RETURN
8090 INPUT "OTHER MONTHLY LIVING COSTS $",X7
8095 RETURN
8100 INPUT "CASH ASSETS",N
8105 RETURN
8110 INPUT "HARD ASSETS (DEPRECIABLE)",P
8115 RETURN
8120 INPUT "VALUE OF CAR",K
8125 RETURN
8130 INPUT "PRICE OF HOME",D
8135 RETURN
8140 INPUT "DOWNPAYMENT",J
8145 RETURN
8150 INPUT "1-FOR USED 2-FOR NEW",F
8155 RETURN
8160 INPUT "INTEREST RATE %",L
8165 RETURN
8170 INPUT "SQ FT ENTER 0 IF UNKNOWN",H
8172 IF H=0 THEN 8200
8175 RETURN
8180 INPUT "NUMBER OF YEARS FOR REPORT",G
8185 RETURN
8200 INPUT "VALUE RANGE OF HOUSE 1-LOW 2-MED 3-HI",I
8210 IF I=1 THEN H=INT(D/35)
8220 IF I=2 THEN H=INT(D/40)
8230 IF I=3 THEN H=INT(D/45)

```

More



Listing 1 continued.

```

8240 RETURN
8300 INPUT "HOUSE APPRECIATION % ",C1
8310 RETURN
9000 REM SINGLE TAX RATES
9002 LET Q=0
9005 IF A>108300 THEN Q=55697+.7*(A-108300)
9007 IF Q>0 THEN RETURN
9010 IF A>81800 THEN Q=37677+.68*(A-81800)
9011 IF Q>0 THEN RETURN
9015 IF A>55300 THEN Q=20982+.63*(A-55300)
9016 IF Q>0 THEN RETURN
9020 IF A>41500 THEN Q=13392+.55*(A-41500)
9021 IF Q>0 THEN RETURN
9025 IF A>34100 THEN Q=9766+.49*(A-34100)
9026 IF Q>0 THEN RETURN
9030 IF A>28800 THEN Q=7434+.44*(A-28800)
9031 IF Q>0 THEN RETURN
9035 IF A>23500 THEN Q=5367+.39*(A-23500)
9036 IF Q>0 THEN RETURN
9040 IF A>18200 THEN Q=3565+.34*(A-18200)
9041 IF Q>0 THEN RETURN
9045 IF A>15000 THEN Q=2605+.30*(A-15000)
9046 IF Q>0 THEN RETURN
9050 IF A>10800 THEN Q=1555+.24*(A-10800)
9051 IF Q>0 THEN RETURN
9055 IF A>8500 THEN Q=1072+.21*(A-8500)
9056 IF Q>0 THEN RETURN
9060 IF A>6500 THEN Q=692+.19*(A-6500)
9061 IF Q>0 THEN RETURN
9065 IF A>4400 THEN Q=314+.18*(A-4400)
9066 IF Q>0 THEN RETURN
9070 IF A>3400 THEN Q=154+.16*(A-3400)
9071 IF Q>0 THEN RETURN
9075 IF A>2300 THEN Q=.14*(A-2300)
9080 IF A<2300 THEN Q=0
9085 RETURN
9100 REM THIS IS TAX TABLE FOR MARRIED (JOINT)
9101 LET Q=0
9105 IF A>215400 THEN Q=11750+.7*(A-215400)
9106 IF Q>0 THEN RETURN
9110 IF A>162400 THEN Q=81464+.68*(A-162400)
9111 IF Q>0 THEN RETURN
9115 IF A>109400 THEN Q=47544+.64*(A-109400)
9116 IF Q>0 THEN RETURN
9120 IF A>85600 THEN Q=33502+.59*(A-85600)
9121 IF Q>0 THEN RETURN
9125 IF A>60000 THEN Q=19678+.54*(A-60000)
9126 IF Q>0 THEN RETURN
9130 IF A>45800 THEN Q=12720+.49*(A-45800)
9131 IF Q>0 THEN RETURN
9135 IF A>35200 THEN Q=8162+.43*(A-35200)
9136 IF Q>0 THEN RETURN
9140 IF A>29900 THEN Q=6201+.37*(A-29900)
9141 IF Q>0 THEN RETURN
9145 IF A>24600 THEN Q=4505+.32*(A-24600)
9146 IF Q>0 THEN RETURN
9150 IF A>20200 THEN Q=3273+.28*(A-20200)
9151 IF Q>0 THEN RETURN
9155 IF A>16000 THEN Q=2265+.24*(A-16000)
9156 IF Q>0 THEN RETURN
9160 IF A>11900 THEN Q=1404+.21*(A-11900)
9161 IF Q>0 THEN RETURN
9165 IF A>7600 THEN Q=630+.18*(A-7600)
9166 IF Q>0 THEN RETURN
9170 IF A>5500 THEN Q=294+.16*(A-5500)
9171 IF Q>0 THEN RETURN
9175 IF A>3400 THEN Q=.14*(A-3400)
9180 IF A<3400 THEN Q=0
9185 RETURN
9200 REM
9201 IF A$="AUSTIN" THEN S=D*.00094+D*.0006+D*.0003+D*.00034
9205 IF A$="GEORGETOWN" THEN S=D*.00136+D*.00045+D*.0003+D*.00034
9210 IF A$="PFLUGERVILLE" THEN S=D*.00065+D*.00033+D*.0003+D*.00038
9215 IF A$="ROLLINGWOOD" THEN S=D*.00044+D*.0003+D*.00036
9220 IF A$="ROUND ROCK" THEN S=D*.00096+D*.0005+D*.00036+D*.00036
9225 IF A$="WESTLAKE HILLS" THEN S=D*.0016+D*.00021+D*.0003+D*.00011
9230 IF A$="ELGIN" THEN S=D*.0013+D*.00038+D*.00038+D*.00021
9235 IF A$="MANOR" THEN S=D*.00083+D*.00083+D*.00021+D*.00038
9240 IF A$="LEANDER" THEN S=D*.00109+D*.0005+D*.0003+D*.00036
9245 REM CALC P&I MD. PAYMENT WHILE YER HERE
9250 T1=((1+L/1200)*360)-1)/((L/1200)*(1+L/1200)*360))
9252 LET Z1=D:LET D=D-J
9255 T1=D/T1
9260 LET D=Z1
9266 RETURN
9790 STOP
9800 REM ***** ENABLE TO WRITE ON 25 LINE *****
9805 REM
9810 PRINT X$(1)
9815 PRINT X$(8)
9820 PRINT CHR$(27)+CHR$(89)+CHR$(56)+CHR$(32);
9825 RETURN
9850 REM ***** DISABLE THE 25TH LINE *****
9855 PRINT X$(9)
9860 RETURN
9890 STOP
9900 REM *****
9910 REM TERMINAL I/O PACKAGE
9920 REM
9930 X$(1)=CHR$(27)+CHR$(106) :REM SAVE CURS POSITION
9940 X$(2)=CHR$(27)+CHR$(89)+CHR$(31+Y)+CHR$(31+X):REM SET TO X,Y
9950 X$(3)=CHR$(27)+CHR$(107) :REM SET TO PREV SAVED

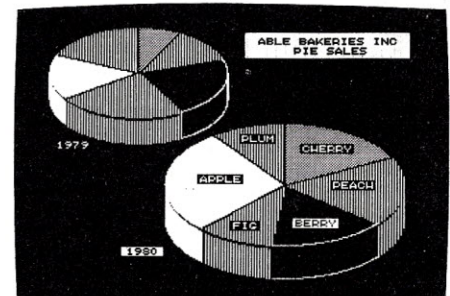
```

More

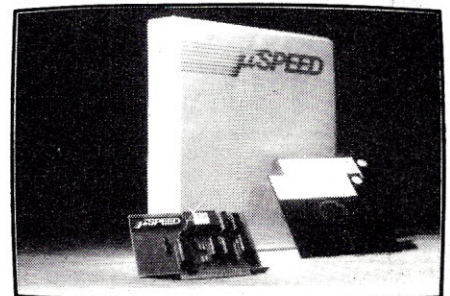
# MORE **POWER** FOR YOUR APPLE **ASPEED II AND II+** LANGUAGE SYSTEMS



APPLESOFT: 30.3 MIN.  
MICROSPEED II: 3.9 MIN.  
MICROSPEED II+: 2.4 MIN.



**FASTEST:** UP TO 100 TIMES FASTER THAN APPLESOFT  
**MOST POWERFUL:** MORE POWER THAN BASIC PASCAL OR FORTRAN  
**EXPANDABLE:** LANGUAGE BASED ON FORTH  
**CREATIVE:** GROW YOUR OWN LANGUAGE  
**USER-FRIENDLY:** EASIEST FOR YOU TO LEARN



REQUIRES APPLE, SINGLE DISK  
μ SPEED II USES 2MHz PROCESSOR  
μ SPEED II+ USES 4MHz PROCESSOR

SEE YOUR DEALER OR CONTACT:

**applied analytics incorporated**

8910 Brookridge Dr., Suite 707, Upper Marlboro, Md. 20870  
(301) 627-6650

I'm Interested: Please Send

☐ μ SPEED II \$495. ☐ 160 page Manual \$35.  
☐ μ SPEED II+ \$645. ☐ Detailed Information

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_

Zip \_\_\_\_\_



Listing 1 continued.

```

9960 X$(4)=CHR$(27)+CHR$(69)      :REM H/U- ERASE
9970 X$(5)=CHR$(27)+CHR$(75)      :REM ERASE LINE FM CURSOR
9980 X$(6)=CHR$(27)+CHR$(112)     :REM REV VIDEO ON
9990 X$(7)=CHR$(27)+CHR$(113)     :REM REV VIDEO OFF
9991 X$(8)=CHR$(27)+CHR$(120)+CHR$(49) :REM ENABLE 25TH LINE
9992 X$(9)=CHR$(27)+CHR$(121)+CHR$(49) :REM DISABLE 25TH LINE
9993 X$(10)=X$(10)                :REM FOR TEMP STORAGE
9994 RETURN

```

Listing 2. File-building program.

```

0100 REM THIS IS TO CREATE THE ORIGINAL DISKETTE FILES FOR THE SIMULATION
0500 OPEN #10, "GARBAGE" FOR OUTPUT
0510 FIELD #10, A=9, B=4, C=4, D=6, F=1, G=2, H=4, J=6, K=5, L=4, M=1, N=9, P=10, W=9
0520 LET A=20000.00
0530 LET B=8
0540 LET C=10
0550 LET D=60000
0560 PUT #10
0570 CLOSE #10
0580 OPEN #10, "MORGARB" FOR OUTPUT
0590 FIELD #10, X4=6, X5=6, X6=6, X7=9, A$=16, C1=4
0600 PUT #10
0610 CLOSE #10
0620 END

```

Listing 3.

```

0100 REM *****
0110 REM THIS PROGRAM IS REALLY A SET OF BASIC PATCHES

```

More

gram run.

At line 560, there is a jump to the terminal initialization routine at 9900; you can leave it out. At 570 the counter variable E is set to 1. It will be advanced so that it will be referenced when it comes time to change the value of that parameter. Note that in line 580, the string X\$(4) clears the terminal. If you have some other way to do this on your terminal you'll have to use it.

From here through much of the program, you merely display the counter E and then type out a description such as INFLATION RATE PER ANNUM, followed by the variable representing that value. The variable C is the inflation rate. Line 825 stops the printing of the variables and values and allows entry of a number. Things look irregular here, but they deal with printing on the 25th line of the terminal. Discard if you have no 25th line.

Lines 880-960 cause a jump to the relevant subroutine up at 8000 to allow changing of a particular parameter. Typing in DONE jumps the user to 1000 where the town (for tax reasons) is entered. Lines 1010 and 1015

# TEXAS COMPUTER SYSTEMS

Offers Lowest Prices on

# TRS-80

# COMPUTERS

**Model II 64K** Free surface freight  
\$3288 on computers  
For air service—call

**Epson Printers**  
\$ Call

**Model III 16K** **Color Computer**  
\$839 4K Lev. I \$319

Radio Shack  
Stereos, Radios  
Discounted. Call for  
discount on orders  
over \$100.

**Model III 48K** **16K Ex. Basic**  
2 Disks \$2095 \$469

For fast, efficient service, we can air freight from Dallas to major a/p near you. Call for information.

- Payment: Money Order, Cashier's Check, Certified Check, Personal checks take 3 wks. VISA, MC, add 3%
- Prices subject to change any time
- No tax out-of-state. Texans add 5%
- Delivery subject to availability
- Shipping extra, quoted by phone

**TEXAS COMPUTER SYSTEMS** ✓328  
Box 951, Brady Texas 76825  
**800-433-5184**  
Texas Residents 817-274-5625

# WP6502®

the finest word processor for

# OHIO SCIENTIFIC

## New Powerful Version 1.3

WP6502 is accepted as being the best word processor for OSI computers. That was version 1.2. Now there's Version 1.3! V1.3 is the ultra simple, professional and powerful version of WP6502. In addition to the exclusive features that made V1.2 the leader, V1.3 has built-in memory and disk tests, headers, true proportional justify, print from anywhere, super-simple editing, and on and on. On cassette and disk (65D or 65U). Priced from \$50 to \$250.

## Get Our Brochures FREE!

We are not just word processing either! As the most reputable name in OSI software, Dwo has been constantly asked to release non-word processing software. Finally we have! Games, utilities and business applications that are absolutely the best (we guarantee it).

Dwo Quong Fok Lok Sow ✓87  
23 East 20th Street  
New York, NY 10003  
(212) 673-6310





cause the data that has been entered to be stored on the disk. Next, the calculations on that data begin.

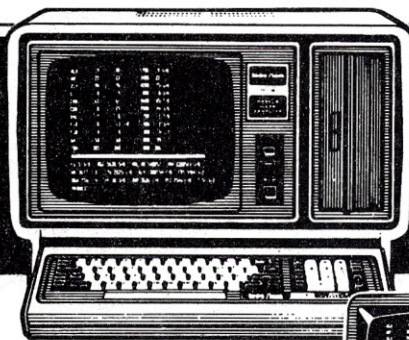
**Data processing**—Starting with the portion of the program in line 1020 and continuing from there to the third part of the program, the first mathematics take place. Line 1060 sends the relevant variables through a subroutine (at lines 90 to 9266) which calculates the local taxes and insurance rates for the particular area of interest. To set up your own area, you must set up each line of the subroutine for each tax entity in your area. The factors that are multiplied by the price of the house (variable D) are the ones you get from your friendly real estate agent.

Towards the end of the subroutine (line 9250 and on), you roll the variable D through some math that calculates a payment based on 30 years, 360 payments. You can add the flexibility of using other mortgage payment plans by adding some variables and prompts earlier in the program. Don't forget to add any new variables to the disk or cassette file, so that they will appear automatically in your calculations.

#### Listing 3 continued.

```
0120 REM THE PATCHES ALLOW YOU TO PUT THE VARIABLES ON
0130 REM THE SCREEN OF THE TERMINAL RIGHT BESIDE THE
0140 REM PROMPT. THIS ELIMINATES REFRESHING THE WHOLE
0150 REM SCREEN EACH TIME A CHANGE IS MADE. YOUR TERM-
0160 REM INAL MUST SUPPORT DIRECT CURSOR ADDRESSING.
0170 REM *****
0180 REM
0190 REM
0460 DEF FNE(X)=X+1
0470 DIGITS= 0
0480 STRING= 80
0490 LINE= 132
0500 OPEN #10 , "GARBAGE" FOR UPDATE
0510 OPEN #20 , "MORGARD" FOR UPDATE
0520 FIELD #10,A=9,B=4,C=4,D=6,F=1,G=2,H=4,J=6,K=5,L=4,M=1,N=9,P=10,W=9
0530 FIELD #20,X4=6,X5=6,X6=6,X7=9,A$=16,C1=4
0540 GET #10
0550 GET #20
0560 GOSUB 9900
0570 PRINT X$(4);
0580 GOSUB 7010
0590 GOSUB 7020
0600 GOSUB 7030
0610 GOSUB 7040
0620 GOSUB 7050
0630 GOSUB 7060
0640 GOSUB 7070
0650 GOSUB 7080
0660 GOSUB 7090
0670 GOSUB 7100
0680 GOSUB 7110
0690 GOSUB 7120
0700 GOSUB 7130
0710 GOSUB 7140
0720 GOSUB 7150
0730 GOSUB 7160
0740 GOSUB 7170
0750 GOSUB 7180
0755 GOSUB 7200
0760 X=21:Y=1:GOSUB 9900:PRINT X$(2);
0770 PRINT CHR$(27);"J";
0775 INPUT "C J",B$
0780 IF B$="DONE" THEN 1000
0790 IF B$="" THEN 770
0800 LET Z=VAL(B$)
```

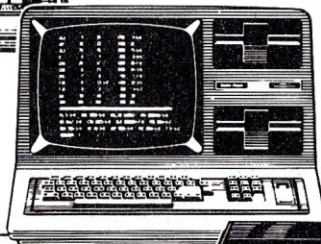
More



#### TRS-80 MODEL II

64-K **\$3350**

8.4 MEGABYTE HARD DISKS  
(PRIMARY UNIT) . . . \$4040.



#### TRS-80 MODEL III

48-K **\$2100** 16-K **\$850**

2 DISK RS-232 (ALL RADIO SHACK EQUIPMENT)

#### FREE

OUT-OF-STATE TAXES AND SHIPPING COSTS

WARRANTIES HONORED BY ALL COMPANY OWNED  
RADIO SHACK STORES OR COMPUTER CENTERS

WE ALSO CARRY A FULL LINE OF PRINTERS,  
COMPUTORS AND ACCESSORIES



TRS-80 COLOR 4-K **\$315**

16-K **\$495** 32-K **\$595**

#### COLOR DISK DRIVES

0- **\$509** 1-2-3- **\$339**

— T.M. TANDY CORP.

WE ACCEPT  
CERTIFIED CHECKS,  
CASHIERS CHECKS  
AND MONEY ORDERS

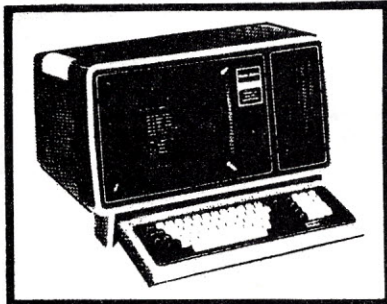
## PERRY OIL & GAS INCORPORATED

137 NORTH MAIN ST., PERRY, MICHIGAN 48872 PHONE (517) 625-4161, MICH.  
WE OWN AND OPERATE A RADIO SHACK — DEALERSHIP R162

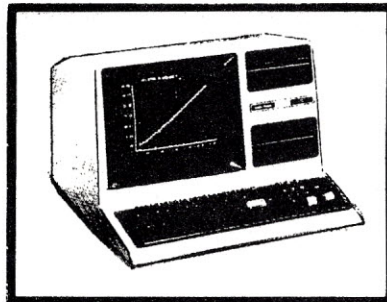
FOR OUR PRICES, PLEASE CALL TOLL FREE **1-800-248-3823**



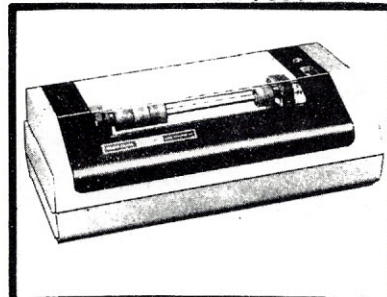
**We have THE  
LOWEST PRICES  
ON TRS-80™**



**Model II 64K \$ 3298**



**Model III 16K \$839**



**Line Printer VII. \$329**

OKIDATA	Microline 80	\$394
	Microline 82	\$499
EPSON MX-70		\$389
EPSON MX-80		\$479

**\$ SAVE**

**MOST ORDERS  
SHIPPED WITHIN  
ONE BUSINESS DAY**

VERBATIM DATALIFETM DISKETTES	
5 1/4-inch (box of 10)	\$25.95
8-inch Double-Density,	\$43.95

\* Payment: Money Order, Cashier's  
Check, Certified Check, Personal  
Checks require 3 weeks to clear. VISA,  
MASTERCARD — Add 3%.

WRITE OR CALL FOR OUR COMPLETE PRICE LIST.

**CALL (602) 458-2477**

— All prices are mail order only —

**RAND'S**

2185 E. FRY BLVD.

SIERRA VISTA, AZ 85635

TRS-80 is a trademark of Tandy Corporation.

Listing 3 continued.

```

0810 IF Z>10 GOTO 830
0820 ON Z GOSUB 8010,8030,8020,8040,8050,8060,8070,8080,8090,8100
0825 GOTO 850
0830 LET Z=Z-10
0840 ON Z GOSUB 8110,8120,8130,8140,8150,8160,8170,8180,8260
0850 IF Z>18 THEN 770
0860 GOTO 760
1000 PRINT "IF TOWN IS ";A$;" HIT RETURN. ELSE ENTER TOWN";
1002 INPUT B$
1003 IF B$="" GOTO 1010
1005 LET A$=B$
1010 REWRITE #20
1015 REM
1020 REM *****
1030 REM IN THIS PART OF THE PROGRAM, IT IS JUST LIKE
1040 REM THE ORIGINAL. YOU DO THE MATH AND SOME OTHER
1050 REM THINGS.
1060 REM *****
1070 REM
7000 REM This is where we put in the values
7010 X=1;Y=1;GOSUB 9900;PRINT X$(2);
7012 PRINT "1 SALARY ="$;A$;
7015 RETURN
7020 X=1;Y=45;GOSUB 9900;PRINT X$(2);
7022 PRINT "2 TAX AS ";
7024 IF M=1 THEN PRINT "SINGLE "
7026 IF M=2 THEN PRINT "MARRIED"
7028 RETURN
7030 X=2;Y=1; GOSUB 9900;PRINT X$(2);
7032 PRINT "3 RAISES % ="$;B$;
7035 RETURN
7040 X=2;Y=45;GOSUB 9900;PRINT X$(2);
7042 PRINT "4 OTHER INCOME ="$;W$;
7045 RETURN
7050 X=4;Y=1;GOSUB 9900;PRINT X$(2);
7052 PRINT "5 INFLATION=%";C$;
7055 RETURN
7060 X=4;Y=45;GOSUB 9900;PRINT X$(2);
7062 PRINT "6 FOOD/MONTH ="$;X4$;
7065 RETURN
7070 X=5;Y=1;GOSUB 9900;PRINT X$(2);
7072 PRINT "7 UTILS/MO ="$;X5$;
7075 RETURN
7080 X=5;Y=45;GOSUB 9900;PRINT X$(2);
7082 PRINT "8 AUTO EXP/MO ="$;X6$;
7085 RETURN
7090 X=6;Y=1;GOSUB 9900;PRINT X$(2);
7092 PRINT "9 MISC/MO ="$;X7$;
7095 RETURN
7100 X=8;Y=1;GOSUB 9900;PRINT X$(2);
7102 PRINT "10 ASSETS/CASH ="$;N$;
7105 RETURN
7110 X=8;Y=45;GOSUB 9900;PRINT X$(2);
7112 PRINT "11 ASSETS/DEP ="$;P$;
7115 RETURN
7120 X=9;Y=1;GOSUB 9900;PRINT X$(2);
7122 PRINT "12 VALUE CAR ="$;K$;
7125 RETURN
7130 X=11;Y=1;GOSUB 9900;PRINT X$(2);
7132 PRINT "13 PRICE/HM ="$;D$;
7135 RETURN
7140 X=11;Y=45;GOSUB 9900;PRINT X$(2);
7142 PRINT "14 DOWNPAYMENT ="$;J$;
7145 RETURN
7150 X=12;Y=1;GOSUB 9900;PRINT X$(2);
7152 PRINT "15 THE HOME IS ";
7154 IF F=1 THEN PRINT "USED";
7155 IF F=2 THEN PRINT "NEW "
7157 RETURN
7160 X=12;Y=45;GOSUB 9900;PRINT X$(2);
7162 PRINT "16 MORT INT % ="$;L$;
7165 RETURN
7170 X=13;Y=1;GOSUB 9900;PRINT X$(2);
7172 PRINT "17 SQUARE FT ="$;H$;
7175 RETURN
7180 X=15;Y=1;GOSUB 9900;PRINT X$(2);
7192 PRINT "18 YRS REPORT ";G$;
7195 RETURN
7200 X=16;Y=1;GOSUB 9900;PRINT X$(2);
7202 PRINT "19 APPRECIATION IN % ";C1$;
7205 RETURN
8000 REM REPAIR SUBROUTINES
8010 INPUT "SALARY ",A
8012 GOSUB 7010
8015 RETURN
8020 INPUT "% PAY RAISES ",B
8022 GOSUB 7030
8025 RETURN
8030 INPUT "1-IF SINGLE 2-MARRIED",M
8032 GOSUB 7020
8035 RETURN
8040 INPUT "OTHER INCOME",W
8042 GOSUB 7040
8045 RETURN
8050 INPUT "INFLATION RATE IN %",C
8052 GOSUB 7050
8055 RETURN
8060 INPUT "FOOD (MONTHLY) $",X4
8062 GOSUB 7060
8065 RETURN
8070 INPUT "UTILITIES (MONTHLY) $",X5
8072 GOSUB 7070

```

More



# Now for the TRS-80™ Models I & III

# LDOS

## VERSION 5.1 THE TRS-80™ OPERATING SYSTEM MODEL I AND III

- \* **DOUBLE** Sided & **DOUBLE** Density support.
- \* **AUTOMATIC** Density recognition.
- \* 35, 40, 77, 80 and any other track counts are supported.
- \* All available drive stepping rates are supported.
- \* Hard Drive support, can be **HANDLED AS A SINGLE DRIVE**.
- \* Hard drive partitioning, one drive can act as up to six.
- \* Intermix 5", 8" and Hard drives, up to a total of 8 drives.
- \* Compatible with the Model I Radio Shack Expansion Interface.
- \* Upward compatible with **TRSDOS** (2.3 & 1.3 as documented).
- \* Fully supports Microsoft language products for **TRS-80**.
- \* Complete media compatibility Model I to Model III and back.
- \* Full support for **LOBO's LX-80** interface.
- \* Full support for **AEROCOMP'S** double density controller (DDC).
- \* Full support for **PERCOM's DOUBLER II**.
- \* Complete documentation (well over 250 pages).
- \* Complete technical information.
- \* A **TOLL-FREE** 800 number for customer service.
- \* An **LDOS** users bulletin board on MicroNET.
- \* A Quarterly **LDOS** users magazine (The **LDOS QUARTERLY**).
- \* A liberal update policy.
- \* An enhanced **BASIC (LBASIC)** including:
  - > Upward compatible with Microsoft Basic.
  - > High speed **LOAD** and **SAVE**.
  - > Run multiple programs with common variables.
  - > **BLOCKED** (variable length) files are supported.
  - > **DOS** commands may be executed from **LBASIC**.
  - > Built in string array, **SORT**.
  - > Single stepper for debugging.
  - > Several new statements and file modes.
- \* A compiled **JOB CONTROL LANGUAGE (JCL)**.
- \* **CONVERT** utility to move files from Model III **TRSDOS**.
- \* An Extended Debugging and Monitor program (with disk access).
- \* **CMDFILE** for movement of disk and/or tape system (/CMD) files.
- \* Device independent operation.
- \* Full **LINKing**, **ROUTing**, **FILTERing** and **SETting** are supported.
- \* **MiniDOS** feature for constant access to certain **DOS** commands.
- \* **RS-232 DRIVER** for serial support.
- \* Sophisticated communications software included.
- \* Wildcard characters and partial Filespecs are supported.
- \* **DATED FILES**, show when a file was last written to.
- \* Backup: Mirror, by Class, if Modified, by Date, by Extension, etc.
- \* Selectable **PURGE** for fast disk "cleanup" of unwanted files.
- \* Print formatter, for control of printer output.
- \* Built in printer **SPOOLER**, to both disk and ram.
- \* Joblog to record all system operations with time stamps.
- \* **UPPER** and **lower** case support, throughout the system.
- \* Blinking cursor with selectable cursor character.
- \* 128 character **TYPE AHEAD** buffering for keyboard input.
- \* Assign strings to individual keys with Key Stroke Multiply (**KSM**).
- \* **SUPER FAST** operation with the **SYSRES** feature.
- \* Extensive user control and system feedback.
- \* Advanced **PATCH** utility for easy maintenance.
- \* Complete transportability of software among all **Z-80 LDOS** systems through the use of the **LDOS** high ram supervisory call system.
- \* Dealers to serve users Nationwide and in the Common Market.
- \* The only **DOS** with a limited **ONE YEAR WARRANTY!**
- \* Enjoy a professional operating system on **YOUR TRS-80!**

\* Specific hardware is required to use these features.

The Ultimate In  
Operating Systems  
For Model I & III

Only **\$169<sup>00</sup>**  
Version 5.1

- \* Model I LDOS provided on 35 track single density media.
- \* Model III LDOS provided on 40 track double density media.
- \* LDOS can be provided on special media configurations at an additional charge.
- \* Prices & Specifications are subject to change without notice.

For Further Information Contact The Distributor Or Dealer Nearest You:

(West)  
**LOBO DRIVES INT'L**  
354 S. Fairview Ave.  
Goleta, CA 93117  
(805) 683-1576

(Central)  
**GALACTIC SOFTWARE LTD.**  
11520 N. Port Washington Rd.  
Mequon, WI 53092  
(414) 241-8030

(East)  
**MISOSYS**  
5904 Edgehill Dr.  
Alexandria, VA 22303  
(703) 960-2998

(The Common Market)  
**MOLIMERX LTD.**  
1 Buckhurst Rd., Bexhill  
Sussex, England  
(0424)-220391

DEALER INQUIRIES WELCOME. LDOS is a product of LSI. TRS-80 & Radio Shack are trademarks.

322  
**LOGICAL  
SYSTEMS  
INC.**  
  
Mequon, WI 53092  
(414) 241-3066



Listing 3 continued.

```

8075 RETURN
8080 INPUT "AUTOMOTIVE COSTS GAS,PAYMENT,ALL (MONTHLY) $",X6
8082 GOSUB 7080
8085 RETURN
8090 INPUT "OTHER MONTHLY LIVING COSTS $",X7
8092 GOSUB 7090
8095 RETURN
8100 INPUT "CASH ASSETS",N
8102 GOSUB 7100
8105 RETURN
8110 INPUT "HARD ASSETS (DEPRECIABLE)",P
8112 GOSUB 7110
8115 RETURN
8120 INPUT "VALUE OF CAR",K
8122 GOSUB 7120
8125 RETURN
8130 INPUT "PRICE OF HOME",D
8132 GOSUB 7130
8135 RETURN
8140 INPUT "DOWNPAYMENT",J
8142 GOSUB 7140
8145 RETURN
8150 INPUT "1-FOR USED 2-FOR NEW",F
8152 GOSUB 7150
8155 RETURN
8160 INPUT "INTEREST RATE %",L
8162 GOSUB 7160
8165 RETURN
8170 INPUT "SQ FT ENTER 0 IF UNKNOWN",H
8172 IF H=0 THEN 8200
8174 GOSUB 7170
8175 RETURN
8180 INPUT "NUMBER OF YEARS FOR REPORT",G
8182 GOSUB 7180
8185 RETURN
8200 INPUT "VALUE RANGE OF HOUSE 1-LOW 2-MED 3-HI",I
8210 IF I=1 THEN H=INT(D/35)
8220 IF I=2 THEN H=INT(D/40)
8230 IF I=3 THEN H=INT(D/45)
8235 GOSUB 7170
8240 RETURN
8260 INPUT "APRECIATION IN % ",C1
8262 GOSUB 7200
8265 RETURN
8790 REM
9000 REM *****
9010 REM FROM HERE ON TO THE END, THE PROGRAM IS THE
9020 REM SAME AS THE ORIGINAL. ALL THE TAX TABLES ARE
9030 REM HERE. IN THE CASE OF HEATHKIT H19 TERMINAL
9040 REM USERS, YOU MUST INCLUDE THE TERMINAL SUBROUTINES.
9050 REM *****
9060 REM

```

```

1.00 SALARY $38500.00
2.00 % PAY RAISES 8.00
3.00 TAXED AS MARRIED
4.00 OTHER INCOME PER ANNUM 0.00

5.00 INFLATION RATE PER ANNUM 12.00
6.00 PRICE OF FOOD PER MONTH 175.00
7.00 COST OF UTILITIES PER MO. 100.00
8.00 CAR EXPENSES INCLUDING PAYMENT PER MO. 300.00
9.00 ALL OTHER COSTS PER MONTH 300.00

10.00 CASH ASSETS 2000.00
11.00 HARD ASSETS 2500.00
12.00 VALUE OF CAR 6600.00

13.00 PRICE OF HOME 68000.00
14.00 DOWNPAYMENT 3400.00
15.00 THE HOME IS NEW
16.00 MORTGAGE INTEREST RATE 11.50
17.00 SQ. FT. OR VAL RANGE 1,2,3 151
.00

18.00 NUMBER OF YEARS TO REPORT 5.00
19.00 APPRECIATION % 10.00

```

Listing 4.

Back at the program, line 1080 sends you to the married or unmarried tax tables at lines 9000 or 9100. Looking at the tables at 9000, the single tables, you will see that this is the back page of the instruction booklet for calculating your own taxes for the IRS form 1040. You set Q=0, and if the table gives it a value, you exit the tables and return from the sub-

routine. Say you earn \$20,000. If you compare the income variable A with \$108,300, you see that the routine scoots you along to the next line. In line 9040 the variable A finally meets the compare criteria. Mainly, A is greater than \$18,200 so the tax is calculated to be \$3565 plus 34 percent of the remaining amount over \$18,200. Now Q has a value greater

than 0 so line 9041 ends the subrou-

tine. Note that the preceding tax calculations are done with no dependents. If you have dependents, you need to subtract the standard deduction for each before you enter the single or married tax tables.

With the tax calculated, you need only to figure the Social Security withholding. This is done back at line 1090.

**Data out**—Starting at line 1100, the printout section of the program begins. Calculations must still be done, but they will be done as the data is printed. The data collected so far and some other data is used to create the first-year display. At the end of the first-year display, after you've had a chance to observe the end totals, you can display the coming years as you have chosen, or you can go back and adjust your figures. If you get too discouraged after the first year, you can just quit.

All these choices come in lines 1240-1290. Beginning at line 1300, you do the recalculations and displays for the series of years you requested in the early part of the program. Note that you adjust the income variable A for pay raises, then recalculate the taxes. You also calculate expenses each year, taking into account the effect of inflation. Look at lines 1500 through 1570. Here you are holding some of the values that are changing and then sending things back through the tax tables to calculate tax benefits of home ownership, taxes with new income and so on.

## Summary

Listing 4 is a sample run. You can see how each of the variables is affecting the outputs. In cases where you will be adding new variables for consideration, keep in mind the three basic sections of the program and be sure to add your new variable in each appropriate section.

Especially keep in mind the subroutines starting at 8000 labeled as the repair subroutines. They're really a part of the input portion of the program. If you forget to put your new variable in subroutine 8000, you won't be able to change its value in succeeding calculations, and you'll get wrong answers.

And finally, a reminder not to forget to add your new variables to the disk or cassette files so that you will not have to reenter the value each time you run the program. ■



# Now NRI takes you inside the new TRS-80 Model III microcomputer to train you at home as the new breed of computer specialist!

**NRI teams up with Radio Shack advanced technology to teach you how to use, program and service state-of-the-art microcomputers...**

It's no longer enough to be just a programmer or a technician. With microcomputers moving into the fabric of our lives (over 250,000 of the TRS-80™ alone have been sold), interdisciplinary skills are demanded. And NRI can prepare you with the first course of its kind, covering the complete world of the microcomputer.

## **Learn At Home in Your Spare Time**

With NRI training, the programmer gains practical knowledge of hardware, enabling him to design simpler, more effective programs. And, with advanced programming skills, the technician can test and debug systems quickly and easily.

Only NRI gives you both kinds of training with the convenience of home



study. No classroom pressures, no night school, no gasoline wasted. You learn at your convenience, at your own pace. Yet you're always backed by the NRI staff and your instructor, answering questions, giving you guidance, and available for special help if you need it.

## **You Get Your Own Computer to Learn On and Keep**

NRI training is hands-on training, with practical experiments and demonstrations as the very foundation of your knowledge. You don't just program your computer, you go inside it...watch how circuits interact...interface with other systems...gain a real insight into its nature.

You also work with an advanced liquid crystal display hand-held multimeter and the NRI Discovery Lab, performing over 60 separate experiments. You learn troubleshooting procedures and gain greater understanding of the information. Both microcomputer and equipment come as part of your training for you to use and keep.



**Training includes new TRS-80 Model III microcomputer, 6-function LCD Beckman multimeter, and the NRI Discovery Lab with hundreds of tests and experiments.**

(TRS-80 is a trademark of the Radio Shack division of Tandy Corp.)

## **Send for Free Catalog... No Salesman Will Call**

Get all the details on this exciting course in NRI's free, 100-page catalog. It shows all equipment, lesson outlines, and facts on other electronics courses such as Complete Communications with CB, TV/Audio and Video, Digital Electronics, and more. Send today, no salesman will ever bother you. Keep up with the latest technology as you learn on the latest model of the world's most popular computer. If coupon has been used, write to NRI Schools, 3939 Wisconsin Ave., Washington, D.C. 20016.



**NRI Schools**  
McGraw-Hill Continuing  
Education Center  
3939 Wisconsin Avenue  
Washington, D.C. 20016

### **NO SALESMAN WILL CALL.**

Please check for one free catalog only.

- ☐ Computer Electronics including Microcomputers
- ☐ Color TV, Audio, and Video System Servicing
- ☐ Electronics Design Technology
- ☐ Digital Electronics
- ☐ Communications Electronics • FCC Licenses • Mobile CB • Aircraft • Marine

- ☐ Basic Electronics
- ☐ Small Engine Servicing
- ☐ Appliance Servicing
- ☐ Automotive Servicing
- ☐ Auto Air Conditioning
- ☐ Air Conditioning, Heating, Refrigeration, & Solar Technology
- ☐ Building Construction

Name \_\_\_\_\_ (Please Print) Age \_\_\_\_\_  
Street \_\_\_\_\_  
City/State/Zip \_\_\_\_\_  
Accredited by the Accrediting Commission of the National Home Study Council



All career courses  
approved under GI bill.  
☐ Check for details

172-111



# Surefire Timer Programs

By Lee Bonnifield

I don't like many of the *ad hoc* delay routines I find. They're hard to understand, I don't know how long they are supposed to delay, and I'm not sure of the clock rate at which they are intended to operate. If I switch clock rates from 2 MHz to 4 MHz, I'm sure I need to adjust the routines, but it isn't obvious how to do it. The routines sometimes affect flags or registers, so they generally can't be used by other programs.

The 58 bytes of the Multiple Interval Timer program solve those problems. No registers or flags are changed when these delay routines are called. In some cases the B register is used to pass a parameter. Listing 1 shows the routines as they would appear if you assembled the code under CP/M to run on a 4 MHz Z-80 microprocessor. Listings 2 and 3 show modifications for other systems.

The listings are shown as if assembled at 0100 (hexadecimal), but you'll probably want to put them in read-only memory, where they'll always be available. If you sometimes change the speed at which your system operates, the one byte labeled DELCONST should be in program-mable memory.

If you include a CALL SMSEC instruction in one of your programs, your processor will be tied up for exactly 250 T-states or clock cycles (e.g., there are 4 million T-states (cycles) per second in a clock running at 4 MHz): 17 for the CALL, 69 for the instructions in SMSEC except for the

Listing 1. These subroutines can be assembled by CP/M for execution on a 4 MHz Z-80. They provide convenient general-purpose delays ranging from 62.5  $\mu$ s to 255 seconds. The millisecond and fractional millisecond delays claimed are exact if your clock rate is exactly 4 MHz and there are no wait states.

```

; Multiple interval timer for 4 MHz Z-80
; Lee Bonnifield
; 1025 Chalk Level Rd - Durham NC 27704

0100                                ORG      0100H

; This sets the number of times the
; innermost loop at L3 will be executed
0000 =                             EQU      13

; Define the Z-80 instruction to CP/M
0010 =                             EQU      10H

; Delay number of seconds in B register
0100 C5F5      BSEC:                PUSH B ! PUSH PSW
0102 CD0A01    CALL      SEC
0105 10FB      DB          DJNZ, L1-$-1 AND 00FFH
0107 F1C1      POP PSW ! POP B
0109 C9        RET

; Delay 1 second
010A CD0D01    SEC:                  CALL      HSEC

; Delay 1/2 second
010D CD1001    HSEC:                 CALL      QSEC

; Delay 1/4 second
0110 C5        QSEC:                 PUSH      B
0111 06FA      MVI          B, 250
0113 CD1801    CALL      BMSEC
0116 C1        POP          B
0117 C9        RET

; Delay number of milliseconds in B register
0118 C5F5      BMSEC:                PUSH B ! PUSH PSW
011A CD2201    CALL      MSEC
011D 10FB      DB          DJNZ, L2-$-1 AND 00FFH
011F F1C1      POP PSW ! POP B
0121 C9        RET

; Delay 1 millisecond
0122 CD2501    MSEC:                  CALL      HMSEC

; Delay 1/2 millisecond (500  $\mu$ sec)
0125 CD2801    HMSEC:                 CALL      QMSEC

; Delay 1/4 millisecond (250  $\mu$ sec)
0128 CD2B01    QMSEC:                 CALL      EMSEC

; Delay 1/8 millisecond (125  $\mu$ sec)
012B CD2E01    EMSEC:                 CALL      SMSEC
```

Address correspondence to Lee Bonnifield, 1025 Chalk Level Road, Durham, NC 27704.

More



DJNZ, eight for the last execution of the DJNZ and 156 for the first 12 executions of the DJNZ. If your clock rate is exactly 4 MHz (and there are no wait states), exactly 62.5  $\mu$ s will be consumed before your processor starts on the instruction following the CALL SMSEC. This minimum delay is one-Sixteenth of a Millisecond; hence the acronym SMSEC.

It's simple to keep exactly doubling the delays with the earlier entry points for 1/8 ms, 1/4 ms, 1/2 ms and 1 ms. If you want a delay in the range of 2 to 255 ms, store the appropriate hexadecimal value (02 to 0FF) in the B register and CALL BMSEC.

If you have a 2 MHz Z-80, it's best

to abandon the SMSEC entry point. Listing 2 shows the modification. This is a particularly useful version if you sometimes run at 4 MHz, because by changing the value at DELCONST to 32, the routines will work at 4 MHz almost as precisely. A CALL MSEC will consume .994 ms, close enough for all my needs.

Users with 8080s will have to change all the DJNZ instructions to DCR B ! JNZ instructions, taking a few more bytes and T-states. Listing 3 shows a way to achieve exact accuracy on a 2 MHz 8080.

The routines can be used with odd clock rates or wait states if you experiment with the value at DELCONST.

Listing 1 continued.

```

; Delay 1/16 millisecond (62.5  $\mu$ sec)
012E C5      SMSEC:  PUSH  B           ; 11 T-states
012F F5      PUSH  PSW           ; 11
0130 3A3901  LDA    DELCONST       ; 13
0133 47      MOV    B,A           ; 4
0134 10      L3:    DB    DJNZ      ;      13 for B>1
                                ;      8 for B=1

0135 FE      DB    L3-$-1 AND 00FFH; 13(LOOPS-1) + 8
0136 F1      POP    PSW           ; 10
0137 C1      POP    B             ; 10
0138 C9      RET                  ; 10

; Total T-states for CALL SMSEC:
; 17 + 69 + 13(LOOPS-1) + 8 = 250
; At 4 MHz, 250 T-states = 62.5  $\mu$ sec

0139 00      DELCONST:  DB    LOOPS
013A          END    0100H

```

```

; Multiple interval timer for 2 & 4 MHz Z-80
; All omitted lines are not
; changed from listing 1
; ...
; ...
; ...
0128 CD2B01  QMSEC:      CALL    EMSEC

; Delay 1/8 millisecond (125  $\mu$ sec)
012B C5      EMSEC:  PUSH  B           ; 11 T-states
012C F5      PUSH  PSW           ; 11
012D 3A3601  LDA    DELCONST       ; 13
0130 47      MOV    B,A           ; 4
0131 10      L3:    DB    DJNZ      ;      13 for B>1
                                ;      8 for B=1

0132 FE      DB    L3-$-1 AND 00FFH; 13(LOOPS-1) + 8
0133 F1      POP    PSW           ; 10
0134 C1      POP    B             ; 10
0135 C9      RET                  ; 10

; Total T-states for CALL EMSEC:
; 17 + 69 + 13(LOOPS-1) + 8 = 250 if LOOPS=13
; = 497 if LOOPS=32
; At 2 MHz, 250 T-states = 125  $\mu$ sec
; At 4 MHz, 497 T-states = 124.25  $\mu$ sec

0136 00      DELCONST:  DB    LOOPS
; For 4 MHz operation, change the
; value at DELCONST from 13 to 32

0137          END    0100H

```

Listing 2. This modification to Listing 1 provides exact delays at the millisecond and fractional millisecond entry points for a 2 MHz Z-80. Changing the value of DELCONST allows for almost exact operation at 4 MHz.

## 500 K Great Reasons to Buy Your Diskettes from Snappware!

Byte for byte, performance counts. Every byte of data you record is important. That's why Snappware offers Scotch diskettes, the highest quality diskette on the market at very competitive prices. Scotch diskettes are tested and guaranteed error-free. And the low abrasivity saves your read/write heads.

### Scotch Brand 744-D

The premium grade mini-floppy. Double density certified. The very finest available for your Model III.

One Box \$29.00/box  
Five Boxes \$28.50/box  
Ten Boxes \$28.00/box

### Scotch Brand #740-0

Eight inch single sided, single density soft sector.

One box \$26.75/box  
Five boxes \$26/box  
Ten boxes \$25.25/box

### Scotch Brand #741-0

Eight inch single sided, double density soft sector. The very best.

One box \$34.50/box  
Five boxes \$33.50/box  
Ten boxes \$32.50/box

### Special Price / Special Pack

Sold in boxes of 50

One box \$160.00  
2-3 boxes \$156.00  
4-5 boxes \$153.00

For every order of ten boxes, receive one head cleaner free, a 25.00 value.

When it comes to diskettes, we have the best price per byte.



Authorized 3M  
Distributor  
Information  
Processing  
Products

SNAPPWARE  
SNAPPWARE

Time saving power at your  
fingertips.



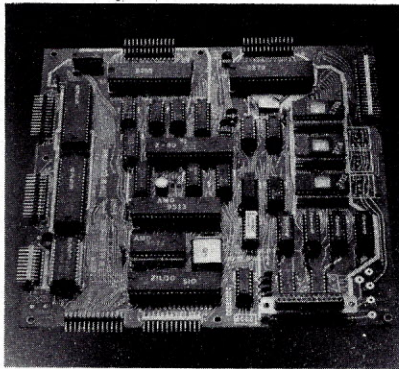
CALL TOLL FREE:

1-800-543-4628

OHIO RESIDENTS  
CALL COLLECT: (513) 891-4496  
3719 Mantell  
Cinti., Ohio 45236



# SINGLE BOARD COMPUTER \$49.95



## The MASTER CONTROLLER BOARD contains:

- Z-80 Microprocessor: will run 8080/8085 and Z-80 programs.
  - 72- Parallel I/O lines: three 8255s
  - Keyboard controller: 8279 (also can control a 16 digit seven segment display)
  - 12K- EPROM: three sockets for 2708, 2716, 2732,
  - 2K- RAM: 2114s
  - 8- Sixteen bit counter timer channels: one 8253 and one AMD 9513
  - 2- Serial I/O ports: one Z-80 SIO chip. One port has an RS-232 interface and connector.
  - 1- High speed arithmetic processor: AMD 9511 or AMD 9512
- All the I/O chips are memory mapped AND I/O mapped. A bus expansion connector is provided. Can be operated on 5 volts only.

**All this on one board less than nine inches on a side**

Only three LSI chips (Z-80, 8255, and EPROM) plus support gates and buffers are required for a working controller.

**BARE BOARD \$49.95**  
With documentation.

**MINIMUM KIT \$99.95** Includes bare board with documentation, one each Z-80, 8255, 2708, two 2114s, and support gates and buffers, all socketed.

**MONITOR \$39.95** This program allows a TTY or CRT to control the MASTER CONTROLLER. This program requires the minimum kit and monitor parts kit. A programmed 2708 is supplied with the MONITOR.

**MONITOR PARTS \$54.95**  
Includes 8253, Z-80 SIO, 1488, 1489, and connector.

**POWER SUPPLY \$39.95** +5V 1A, -5V 1/4A, +12V 1/4A, -12V 1/4A

**POWER SUPPLY \$44.95** +5V 2A, otherwise same as above.

Please include \$2 postage and handling.

OEM and dealer inquiries invited.  
VISA and MASTER CARD accepted.

**R.W. ELECTRONICS** ✓390  
3165 North Clybourn  
Chicago, IL 60618  
(312) 248-2480

Greater precision can be obtained by eliminating the entry points for the shortest delays, as SMSEC was eliminated from Listing 2 and 3. This al-

lows DELCONST to be larger, so that adjustments to it are finer. You'll probably never need accuracy closer than a few percent. ■

```

; Multiple interval timer for 8080
; All omitted lines are not
; changed from listing 1
; ...
0000 =      LOOPS      EQU      10
; ...
; no need to define DJNZ
; ...
; ...
0102 CD0C01  L1:      CALL      SEC
0105 05      DCR      B
0106 C02001  JNZ      L1
; ...
; ...
011C CD2601  L2:      CALL      MSEC
011F 05      DCR      B
0120 C21C01  JNZ      L2
; ...
; ...
; Delay 1/4 millisecond (250 μsec)
012C CD2F01  QMSEC:   CALL      EMSEC
; ...
; Delay 1/8 millisecond (125 μsec)
012F C5      EMSEC:   PUSH      B          ; 11 T-states
0130 F5      PUSH      PSW          ; 11
0131 3A3F01  LDA      DELCONST      ; 13
0134 3A3F01  LDA      DELCONST      ; 13
0137 47      MOV      B, A          ; 5
0138 05      L3:      DCR      B          ; 5
0139 C23801  JNZ      L3          ; 10
; ...
; ...
013C F1      POP      PSW          ; 10
013D C1      POP      B          ; 10
013E C9      RET          ; 10
; Total T-states for CALL EMSEC:
; 17 + 83 + 15*LOOPS = 250
; At 2 MHz, 250 T-states = 125 μsec

013F 0A      DELCONST:  DB      LOOPS

0140      END      0100H

```

Listing 3. This modification to Listing 1 provides exact delays at the millisecond and fractional millisecond entry points for a 2 MHz 8080. Notice that an 8080 requires more T-states (clock cycles) for some instructions than a Z-80.

## — Professional — Real Estate Software

For APPLE, TRS-80 & PET

### Property Management System (32K, 1 Disk Systems)

#### Features:

- Tenant Information
- Late Rent Reports
- YTD & Monthly Income
- Handles —
  - Partial Payments
  - Returned Checks
  - Advance Payments
  - Prints Receipts
- 5 Digit Expense Accounts
- Building Expense Report
- Vendor Expense Report
- Income Tax Report
- All Reports Can Be Printed
- Complete Documentation
- Easy Data Entry & Edit
- Vacancy Report

**Price \$275.00**

### Real Estate Analysis Modules: (Cassette or Disk)

- 1) Home Purchase Analysis
- 2) Tax Deferred Exchange
- 3) Construction Cost/Profit
- 4) Income Property Cashflow
- 5) APR Loan Analysis
- 6) Property Sales Analysis
- 7) Loan Amortization

**\$35 Per Module**

**software**  
**Realty company**  
At Computer Stores Everywhere  
Or Order COD Direct  
(Cal Residents Add 6% Sales Tax)  
(213) 372-9419

Dept. K 1116 'F' 8th St., Manhattan Beach, CA 90266

## FLOPPY DISK DRIVES

# \$275

Famous make 40 Track drives, in grey textured enclosure with power supply. Fully tested and guaranteed.

**ADD \$20 FOR "FLIPPY."**  
**80 TRACK "FLIPPY" \$395**  
**40/40 DOUBLE SIDED \$395**  
**EPSON PRINTERS \$CALL**  
**C. ITOH PRINTERS \$CALL**

**CORSAIR COMPUTER CORP.**  
7952 Highway 80 West  
Fort Worth, TX 76116  
**817-244-8051**

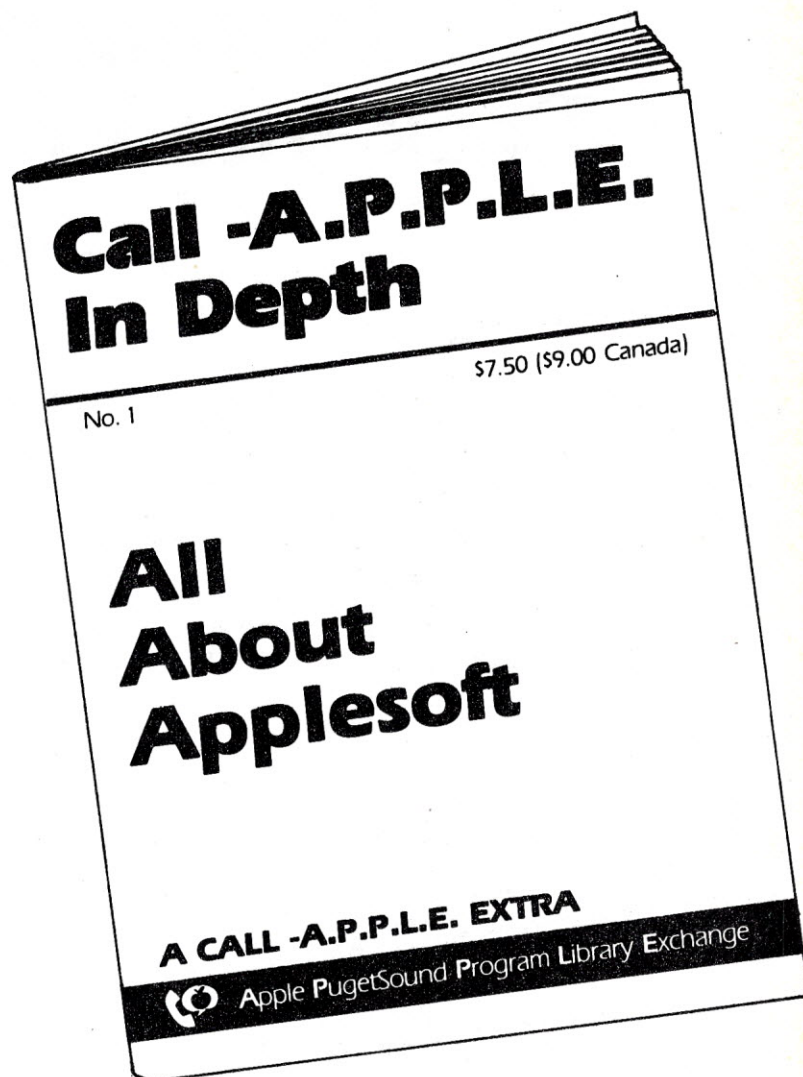


**INTRODUCING:**

# **IN DEPTH**

136 pages of timeless  
reference material on  
heavy duty stock.

- **APPLESOFT FROM  
BOTTOM TO TOP**
- **APPLESOFT  
INTERNALS**
- **PROGRAM  
SPLITTER**
- **AMPLIFYING  
APPLESOFT**
- **HI-RES NOTES**
- **and more**



**AVAILABLE AT DISCRIMINATING APPLE DEALERS WORLD-WIDE**

**Dealer Inquiries Invited**

**Membership and dealer information:**

**Apple Pugetsound Program Library Exchange**

**304 Main Ave. S., Suite 300-M**

**Renton, WA 98055**

**(206) 271-4514**



# Putting the Joy Back into Programming

By Frank Donato

Last November, Alfred J. Bruey described in this magazine a way to write on the screen of the PET with switches attached to the application connector ("Microcomputer Hardware for the Handicapped," p. 173). Why not take his idea one step further, and use these switches to program?

This program does just that. It makes the PET execute a special insert program just before its normal interrupt routine, every 1/60 of a second, by changing the address of the interrupt routine (from E685 on the old PET or 2EE6 on the new PET) to the routine at 033A and then jumping back to the regular PET interrupt at the above address. (See Fig. 1.)

The program, then, runs invisible to the user.

By using a special joystick with three switches, the programmer can:

1. Control displaying or not displaying (normal PET operation) a subset of ASCII characters on the top right-hand corner of the PET screen.
2. Take the character displayed and place it at the current cursor position on the line and in the keyboard buffer.
3. Force a carriage return.

I use three microswitches attached

to the PET user port lines, PA5, PA6 and PA7. The hardware details will be discussed later in this article.

Briefly, to effect a carriage return, only one switch (SW1) attached to PA5 need be on. To display characters on the top right-hand corner of the screen (scan mode), SW2 attached to PA7 must be on.

Finally, to print the character cur-

rently displayed, both the scan switch SW2 (PA7) and the print switch SW3 (PA6) must be on.

You can do the same with only two switches: one for scan and one for print. You could carriage return when a special character is displayed. But the scan rate must be slow (each character is displayed for about one second), and so the third switch for a carriage return lets you do this at any time. Of course, this makes the hardware more complex. Fig. 2. is a flowchart of the program.

## Details of Program

Block A, lines 160 to 180 of assembly. The accumulator is loaded with the contents of the PET user port (port A of the 6522 VIA at address E84F). A check is made to see if the byte here is equal to DF (11011111). That is, is bit 5 zero? If it is, indicating SW1 is on (carriage return), you jump to line 580.

At line 580 the X-register is loaded with the number of characters in the keyboard buffer and the accumulator is loaded with a carriage return (0D).

The VIA register is reread until it no longer shows a carriage return (SW1 released). The accumulator is then placed in the keyboard buffer, thus effecting a carriage return. This method of rereading the VIA port acts as a debounce and ensures that only one carriage return is done when the switch is released.

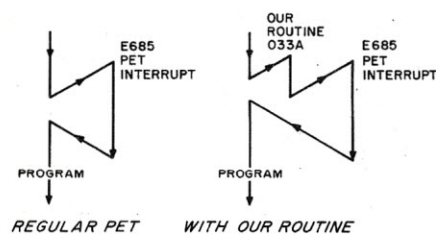


Fig. 1. Special insert program modification.

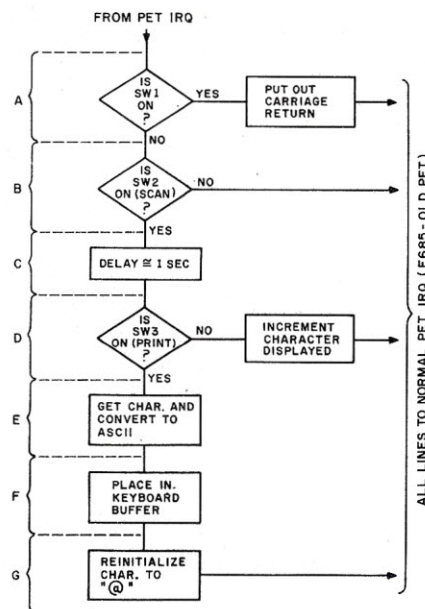


Fig. 2. Program flowchart.

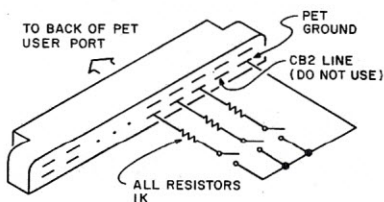


Fig. 3. Grounding through a 1k resistor.

Address correspondence to Frank Donato, 1306 Wedgewood Drive, Sudbury, Ontario P3A 3E2, Canada.



Note that the keyboard buffer must be reset to 0. After this you holds only ten characters so that jump to the regular PET interrupt when the buffer pointer is ten, it (line 690).

```

0010 ;*****
0020 ;*** JOYSTICK PROGRAMMER FOR ***
0030 ;*** THE CBM P.E.T. ***
0040 ;*** BY FRANK DONATO ***
0050 ;*** DEC 30, 1980 ***
0060 ;*****
0070 ;
0080 ;
0090 COUNT .DE $03B3 ;TIMING COUNT
0100 PORT .DE $E84F ;USER PORT
0110 INT .DE $E685 ;PET INTERRUPT
0120 SCREEN .DE $804F ;WHERE CHAR IS DISPLAYED
0130 KBUFF .DE $020F ;KBD BUFFER
0140 NCHAR .DE $020D ;NO OF CHRS IN KBD BUF
0150 .BA $033A ;LOCATION OF PROGRAM
033A- AD 4F E8 0160 LDA PORT ;LOAD PORT VALUE
033D- C9 DF 0170 CMP #DF ;IS THERE A CR ?
033F- F0 53 0180 BEQ OUT1 ;IF SO OUTPUT ONE
0341- C9 7F 0190 CMP #7F ;IF NOT CHECK FOR SCAN
0343- D0 40 0200 BNE NSCAN ;IF NOT GO TO NSCAN
0345- A9 03 0210 LDA #03 ;IF SCAN START LOOP
0347- 8D B3 03 0220 STA COUNT
034A- A2 FF 0230 LDX #FF
034C- A0 FF 0240 LP2 LDY #FF
034E- 88 0250 LP3 DEY
034F- D0 FD 0260 BNE LP3
0351- CA 0270 DEX
0352- D0 F8 0280 BNE LP2
0354- CE B3 03 0290 DEC COUNT
0357- D0 F1 0300 BNE LP1 ;END OF TIMING LOOP
0359- AD 4F E8 0310 LDA PORT ;GET PORT VALUE
035C- C9 3F 0320 CMP #3F ;DO WE PRINT ?
035E- F0 06 0330 BEQ PRNT ;IF SO GO TO PRNT
0360- EE 4F 80 0340 INC SCREEN ;IF NOT INC SCREEN CHAR
0363- 4C 85 E6 0350 JMP INT ;AND GO TO REG INTERRUPT
0366- AD 4F 80 0360 PRNT LDA SCREEN ;GET CHAR TO PRINT
0369- 48 0370 PHA ;START OF ASCII CONVERSION
036A- 29 20 0380 AND #20
036C- D0 04 0390 BNE AS2
036E- 68 0400 PLA
036F- 09 40 0410 ORA #40
0371- 48 0420 PHA
0372- 68 0430 AS2 PLA
0373- 29 7F 0440 AND #7F ;END OF ASCII CONVERSION
0375- AE 0D 02 0450 LDX NCHAR ;GET # OF CHRS IN BUF
0378- 9D 0F 02 0460 STA KBUFF,X ;STORE CHR IN BUF
037B- E8 0470 INX ;INC THE POINTER
037C- E0 0A 0480 CPX #0A ;ARE THERE 10 ?
037E- D0 02 0490 BNE NFL ;BRANCH IF NOT FULL
0380- A2 00 0500 LDX #00 ;IF FULL RESET TO 0
0382- 8E 0D 02 0510 NFL STX NCHAR ;PUT POINTER BACK
0385- A9 00 0520 NSCAN LDA #00 ;RESET CHAR
0387- 8D 4F 80 0530 STA SCREEN ;PUT BACK ON SCREEN
038A- AD 4F E8 0540 CHK LDA PORT ;CHECK PORT
038D- C9 63 0550 CMP #63 ;IS SCAN & PRINT STILL ON ?
038F- F0 F9 0560 BEQ CHK ;KEEP CHECKING IF SO
0391- 4C 85 E6 0570 JMP INT ;IF NOT TO INT.
0394- AE 0D 02 0580 OUT1 LDX NCHAR ;GET POINTER TO BUF
0397- A9 0D 0590 LDA #0D ;LOAD A WITH A CR
0399- 9D 0F 02 0600 STA KBUFF,X ;PUT OUT THE CR
039C- E8 0610 INX ;INCREMENT POINTER
039D- AD 4F E8 0620 CHK2 LDA PORT ;GET PORT VALUE
03A0- C9 DF 0630 CMP #DF ;IS A CR STILL THERE
03A2- F0 F9 0640 BEQ CHK2 ;IF SO KEEP CHECKING
03A4- E0 0A 0650 CPX #0A ;10 CHARS IN BUFFER?
03A6- D0 02 0660 BNE STOR ;PUT POINTER BACK IF NOT
03A8- A2 00 0670 LDX #00 ;OTHERWISE RESET POINTER
03AA- 8E 0D 02 0680 STOR STX NCHAR ;POINTER IS BACK
03AD- 4C 85 E6 0690 JMP INT ;TO PET INTER
03AD- 4C 85 E6 0690 .EN

```

LABEL FILE: [ / = EXTERNAL ]

```

/COUNT=$03B3 /PORT=$E84F /INT=$E685
/SCREEN=$804F /KBUFF=$020F /NCHAR=$020D
LP1=$034A LP2=$034C LP3=$034E
PRNT=$0366 AS2=$0372 NFL=$0382
NSCAN=$0385 CHK=$038A OUT1=$0394
CHK2=$039D STOR=$03AA
//
0000

```

Program listing.

Block B, lines 190 to 200. If there is no carriage return, you check for a scan. You check the accumulator to see if PA7 is on (indicating scan). If not, you branch to line 520 where you reset the displayed character to @ and then jump to the regular PET interrupt (lines 570).

Note that checking the port (lines 540-560) has no effect in this case because the scan and print switches are not both on.

Block C, lines 210 to 300. If the scan switch is on (SW2), you wait in a loop effected by loading the X and Y registers with FF and decrementing them. Also, you use location 03B3 as a counter to do this three times. (This could be changed to vary the time that each character is displayed.)



**Free**

**Microprocessor Catalog**

40 page catalog of 6800, single board computers, interface modules, SPRINT 68 control computer, development system, WIZRD multitasking DOS, assemblers, compilers, BASIC, cross assemblers, cross compilers, custom engineering, OEM applications software.

**WINTERK**

Winterk Corp.  
1601 South Street  
Lafayette, IN 47904  
317-742-8425

**'68' MICRO JOURNAL™**

**6800-6809-68000**

★ The only ALL 68XX Computer Magazine

USA  
1 Yr. - \$18.50 2 Yr. - \$32.50 3 Yr. - \$48.50  
\*Foreign Surface Add \$12 Yr. to USA Price  
\*Foreign Air Mail Add \$35 Yr. to USA Price  
\*Canada & Mexico Add \$5.50 Yr. to USA Price

OK, PLEASE ENTER MY SUBSCRIPTION  
Bill my: M/C ☐ — VISA ☐

Card # \_\_\_\_\_  
Expiration Date \_\_\_\_\_  
For ☐ 1-Yr. ☐ 2 Yrs. ☐ 3 Yrs.  
Enclosed: \$ \_\_\_\_\_  
Name \_\_\_\_\_  
Street \_\_\_\_\_  
City \_\_\_\_\_  
State \_\_\_\_\_ Zip \_\_\_\_\_

**68 Micro Journal**  
5900 Cassandra Smith Rd.  
Hixson, TN 37343



Block D, lines 310 to 350. After the loop, you load the accumulator with the A port, and check if SW2 and SW3 are on by comparing with 3F (this would indicate print the character displayed). If not, you increment the value of the displayed character and jump to the PET interrupt (this is scan condition only; SW2 on and SW3 off).

Block E, lines 360 to 570. If both SW2 and SW3 are on, (indicating print condition), you jump to line 360.

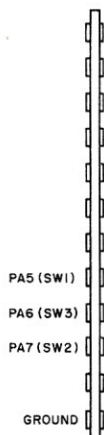


Fig. 4.

Here the accumulator is loaded with the screen code for the character displayed. It is converted to ASCII by the routine in lines 370 to 440. The X-register is loaded with the number of characters in the keyboard buffer, and then the accumulator (now ASCII value) is stored in the keyboard buffer. The screen character is now reset to @. The VIA port is reread and the program does not continue until the switches are released. Again, this provides debounce and prevents multiple prints. As soon as the switches are released, the program jumps to the PET interrupt (line 570).

Note that if none of the switches

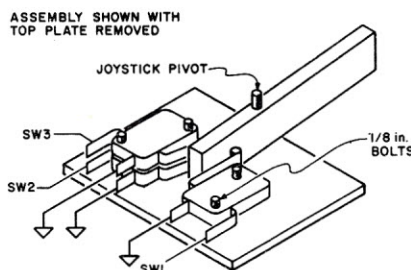


Fig. 5.

are on, that is, if the joystick is in the center position, the PET acts normally except the character @ is at the top right-hand corner.

## Hardware

The hardware was probably the most difficult part of this project. Since the PET resets the VIA so that the A port is normally on input and at +5 V, to sense a switch closure, the line involved would have to be grounded. This is done through a 1k resistor. The schematic in Fig. 3 shows this modification.

Note that PA5, PA6 and PA7 are located on the bottom part of the user port as in Fig. 4.

The three 1k resistors are soldered to the bottom of the connector and lines from these go to three microswitches sandwiched between two plates. A flat bar of aluminum is pivoted between these and acts as the joystick (see Fig. 5).

Note that SW2 and SW3 are set so that, as the joystick is moved, SW2 is on first; then, by moving the joystick a bit more, SW3 also goes on. This is done by bending the microswitch levers.

# CP/M<sup>®</sup> SOFTWARE

QUALITY BUSINESS APPLICATIONS  
LARGEST SELECTION IN U.S.A.

## ★ ★ SOFTWARE SPECIALS ★ ★

WORDSTAR — MICROPRO .....	\$314
MAILMERGE — MICROPRO .....	\$99
DATASORT — MICROPRO .....	\$239
dbASEII — ASHTON-TATE .....	\$595
MICROPLAN — CHANG-LABS .....	\$495
SUPERCALC — SORCIM .....	\$259
FMS-80 — SYSTEMS + .....	\$695
BASIC 80 — MICROSOFT .....	\$285
BASIC COMPILER — MICROSOFT .....	\$324
LEGAL BILLING — MICROCRAFT .....	\$595
CLIENT ACCT. — ABS .....	\$795
SPELLBINDER — LEXISOFT .....	\$325
SPELLSTAR — MICROPRO .....	\$169

PEARL 3 — CPU .....	\$499
T MAKER-LIFEBOAT .....	\$275
ULTRASORT II — .....	\$149
GENERAL LEDGER .....	\$399
A/P .....	\$399
PAYROLL .....	\$599
WHOLESALE/RETAIL DIST. .....	\$695
JOB ACCOUNTING .....	\$275
CASH DISBURSEMENTS .....	\$199

## HOW TO ORDER CALL: (617) 963-7220 PROMPT DELIVERY!

Payment: UPS C.O.D. Certified Check or Cash. 5% discount for prepaid orders. Mass. residents add 5%. Shipping & handling \$5 (Supplies, Prepay only). Items subject to avail. Price subject to change. Software sale conveys a license for use on one system. CP/M Reg. Trademark of Digital Research.

**STANDARD SOFTWARE CORPORATION OF AMERICA** ✓ 143

10 MAZZEO DRIVE, RANDOLPH, MA 02368

(617) 963-7220



ASK ABOUT OUR 14 DAY MONEY BACK GUARANTEE AVAILABLE ON SOME PACKAGES

# THE COPYRIGHT KIT

How to Copyright  
Your Computer Software

A self-instruction booklet on copyrighting the computer programs you write. IF YOU HAVE WRITTEN A COMPUTER PROGRAM YOU NEED THIS BOOK! INCLUDES: Step-by-step instructions, sample forms, as well as discussions of copyrights, patents and trade secrets, your rights secured by copyright, legal remedies upon infringement, material not copyrighted. MUCH MORE! Written by Arthur J. ... Published by National Attorneys' Publications, Inc. and distributed exclusively through B.T. Enterprises.  
ONLY ..... \$11.95



B.T. Enterprises  
171 Hawkins Road  
Centereach, New York  
(516) 981-8568 (Voice)  
(516) 588-5836 (Data)  
MNET-70331, 105



✓ 124 Add \$2.00 S & H, NYS res. add appr. tax



# we beat the price...

## ATARI



**800™ \$749**

**ATARI**  
Computers  
for people.™

## ATARI 810 DISC DRIVE



**\$444**

### ATARI SOFTWARE

CX404 Word Processor.....	\$119.00
CX405 PILOT.....	\$68.00
CX413 MICROSOFT BASIC.....	\$68.00
CX4101 Invitation to Programming 1.....	\$17.00
CX4102 Kingdom.....	\$13.00
CX4103 Statistics.....	\$17.00
CX4104 Mailing List.....	\$17.00
CX4105 Blackjack.....	\$13.00
CX4106 Invitation to Programming 2.....	\$20.00
CX4107 Biorhythm.....	\$13.00
CX4108 Hangman.....	\$13.00
CX4109 Graph It.....	\$17.00
CX4110 Touch Typing.....	\$20.00
CX4111 Space Invaders.....	\$17.00
CX4112 States & Capitals.....	\$13.00
CX4114 European Countries & Capitals.....	\$13.00
CX4115 Mortgage & Loan Analysis.....	\$13.00
CX4116 Personal Fitness Prog.....	\$59.00
CX4117 Invitation to Programming 3.....	\$20.00
CX4118 Conversational French.....	\$45.00
CX4119 Conversational German.....	\$45.00
CX4120 Conversational Spanish.....	\$45.00
CX4121 Energy Czar.....	\$13.00
CX4125 Conversational Italian.....	\$45.00

CX6001 U.S. History.....	\$23.00
CX6002 U.S. Government.....	\$23.00
CX6003 Supervisory Skills.....	\$23.00
CX6004 World History.....	\$23.00
CX6005 Basic Sociology.....	\$23.00
CX6006 Counseling Procd.....	\$23.00
CX6007 Principal of Act.....	\$23.00
CX6008 Physics.....	\$23.00
CX6009 Great Classics.....	\$23.00
CX6010 Business Comm.....	\$23.00
CX6011 Basic Psychology.....	\$23.00
CX6012 Effective Writing.....	\$23.00
CX6014 Principals of Econ.....	\$23.00
CX6015 Spelling.....	\$23.00
CX6016 Basic Electricity.....	\$23.00
CX6017 Basic Algebra.....	\$23.00
CX8106 Bond Analysis.....	\$20.00
CX8107 Stock Analysis.....	\$20.00
CX8108 Stock Charting.....	\$20.00
CXL4001 Education System Master.....	\$21.00
CXL4002 Basic Computing Language.....	\$46.00
CXL4003 Assembler Editor.....	\$46.00
CXL4004 Basketball.....	\$24.00
CXL4005 Video Easel.....	\$24.00
CXL4006 Super Breakout.....	\$30.00
CXL4007 Music Composer.....	\$45.00
CXL4009 Chess.....	\$30.00
CXL4010 3-D Tic-Tac-Tow.....	\$24.00

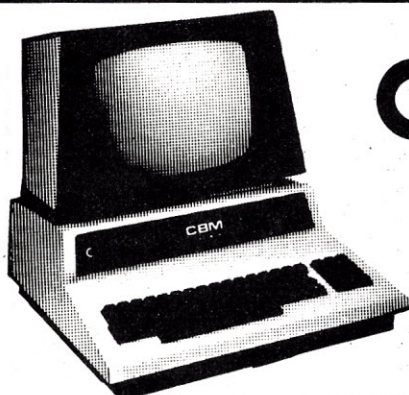
CXL4011 Star Raiders.....	\$39.00
CXL4012 Missile Command.....	\$32.00
CXL4013 Asteroids.....	\$32.00
CXL4015 TeleLink.....	\$20.00
Compuhome.....	\$74.95
Visicalc.....	\$149.00
Letter Perfect (Word Processor).....	\$119.00
Source.....	\$89.00

### Atari® Peripherals:

400 16K.....	\$329.00
410 Recorder.....	\$59.00
822 Printer.....	\$359.00
825 Printer.....	\$ CALL
830 Modem.....	\$159.00
850 Interface.....	\$ CALL

### Atari® Accessories

New DOS 2 System.....	\$21.00
CX70 Light Pen.....	\$64.00
CX30 Paddle.....	\$18.00
CX40 Joy Stick.....	\$18.00
CX853 16K RAM.....	\$89.00
Microtek 16K RAM.....	\$75.00
Microtek 32K RAM.....	\$169.00

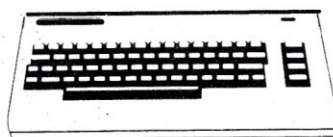


**CBM 8032 \$1099**

4016.....	\$799.00
4032.....	\$999.99
8096.....	\$1795.00
CBM4022 Printer.....	\$629.00
Tally 8024.....	\$1699.00
CBM C2N Cassette Drive.....	\$69.00
CBM4040 Dual Disk Drive.....	\$999.00
CBM8050 Dual Disk Drive.....	\$1349.00



**commodore**



**VIC 20  
\$259**

Vic-TV Modul.....	\$19.00
Vic Cassette.....	\$69.00
Vic Disk Drive.....	\$ Call
Vic 6 Pack program.....	\$44.00

### CBM Software

WordPro3 Plus.....	\$199.00
WordPro4 Plus.....	\$299.00
Commodore Tax Package.....	\$399.00
Visicalc.....	\$149.00
BPI General Ledger.....	\$329.00
OZZ Information System.....	\$329.00
Dow Jones Portfolio.....	\$129.00
Pascal.....	\$239.00
Legal Time Accounting.....	\$449.00
World Craft 80.....	\$289.00
Word Check.....	\$180.00
Create-A-Base.....	\$239.00
Power.....	\$89.00
Socket-2-Me.....	\$20.00
Jinsam.....	Call

### Disks

CX8100 Blank Disk (5).....	\$22.00
Sycorn Blank Disk (10).....	\$29.00
Maxell Blank Disk (10).....	\$36.00
Maxell Blank Disk (10).....	\$46.00

### Printers

Call for prices on the new NEC models.	
Epson MX-70.....	} Call for Prices
Epson MX-80.....	
Epson MX-80 FT.....	
Diablo 630.....	
TEC 1500 Starwriter 25cps.....	\$1495.00
TEC 1500 Starwriter 45cps.....	\$1795.00

**No Risk, No Deposit On Phone Orders, COD or Credit Card, Shipped Same Day You Call \***

\* on all in stock units

IN PA, CALL (717) 327-9575

**(800) 233-8950**

COMPUTER MAIL ORDER ✓384

501 E. 3RD ST., WILLIAMSPORT, PA 17701

To Order:

Phone orders invited (800 number is for order desk only). Or send check or money order and receive free shipping. Pennsylvania residents add 6% sales tax. Add 3% for Visa or M.C. Equipment is subject to price change and availability without notice. Please call between 11 AM & 6 PM.





After suitable adjustment of the joystick (the switches can be checked with an ohmmeter), the program can be tested. Of course, the program can be tested without the complexity of the above hardware by attaching some simple switches, as in Fig. 3.

## Implementation

To implement the program the following steps should be taken:

1. The joystick is connected to the PET user port.
2. The main program is written in the second cassette buffer starting at 033A. This can be done with "TIM" or in the case of a new PET, the machine-language monitor (POKES from BASIC could also be used).
3. The interrupt vector is changed to point to 033A, using TIM or the monitor (do not use POKES).

On the old PET this is done by changing locations 0219-021A from 85E6 to 3A03, respectively, 0090-0091 from E62E to 3A03, respectively, on the new PETs, or 0090-0091 from 55E4 to 3A03 for PETs with 4.0 BASIC. Of course nothing happens except the character @ is displayed on the top right-hand corner.

When the paddle is moved so that SW2 is activated, the character should start changing. When the desired character is shown, move the lever further so that SW3 is also activated. When the paddle is released, the character should appear at the cursor position and the character on the screen should revert back to @. We can continue scanning and printing by repeating the above procedure.

Once the line is completed, move the paddle so that SW1 is activated. This will cause a carriage return and move the cursor to the next line.

For example, using the above procedure, if a line is filled with 73\*4 and a carriage return is now done (SW1 on), the PET should print 12. It should then automatically print READY. In short, it acts like a normal PET.

	Old PET	New PET	4.0 BASIC
INT	E685	2EE6	E455
KBUFF	020F	026F	026F
NCHAR	020D	009E	009E

Table 1.

Note that the listing is for an old PET. For new PETs, addresses to be changed are shown underlined in the listing and are shown in Table 1.

## Conclusion

One disadvantage of the above is the speed of programming. It is slow. However, it opens opportunities for some people to express themselves.

Also, some of the above methods could be used in other programs or games.

The hardware could be varied. For example, for people with gross-motor capability only, the joystick could be mechanically altered to be less sensitive. Instead of a joystick, a foot control, head control or other means could be used.

The timing loop used in displaying the character could be varied in length to suit the programmer. The present method of displaying the character could be varied by possibly displaying all the characters in a matrix format and having a moving cursor point to each character in an X-Y coordinate mode. This would speed up character choosing but would take up more screen area. ■

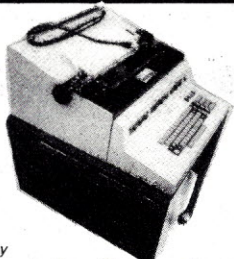
## COMPUTER BARGAINS!!!

### Daisy Terminals

Featuring 110, 150 and 300 baud, RS232 I/O. Full KSR, full or half duplex, Diablo Hytype-I printer, plastic Daisy wheel, off-lease and refurbished. 4-way plotting mode under remote or KBD control. Built in KBD, ptr. typing table, power supply and more, with user manual and schematics. Refurbished.

**\$999<sup>00</sup>ea.**

Add \$45.00 for Crate - Pay Shipping on Delivery



### Selectric Terminals

Famous Datel-built "Selectric" I/O terminal. Used, "as-is" cond. (may need minor service). Features 15" carriage Selectric typewriter/printer, KBD/Sole-noid assembly, power supply & RS232 I/O circuit board. Speaks IBM "correspondence" protocol. Limited info included.

Used "As-Is" ... **Only \$499<sup>00</sup>ea.**

Add \$20.00 for Packaging & Handling - Pay Shipping on Delivery

### 5 1/4" FLOPPY DRIVES

Double sided MPI Model 52 Diskette Drives featuring approx. 170 KBytes of storage. INTERFACE SAME AS SA-400 MINI. Used, good physical cond'n., UNTESTED, "as-is" LATE MFR. Schematics included. Less power supply and case.

**Only \$319<sup>00</sup>ea.**

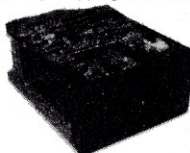
### WINCHESTER DRIVES

Just in... SA1002 & 1004 "as-is" no data.

SA1002 2 Meg Winchester Drive, ... **\$380<sup>00</sup>ea.**

SA1004 4 Meg Winchester Drive, ... **\$450<sup>00</sup>ea.**

SA-851 Dbl. Sided Floppy w/data, as-is ... **\$389<sup>00</sup>ea.**



All Drives Are  
Used, Whole, Untested  
PLUS SHIPPING

WRITE OR CALL FOR OUR BARGAIN-PACKED PERIPHERAL FLYER!!

**COMPUTERS,  
PERIPHERALS,  
UNLIMITED!**

Formerly CFR Associates, Inc.  
**617/372-8637**

18 GRANITE STREET  
HAVERHILL, MASS. 01830

MasterCharge & VISA Accepted

## MBC SYSTEMS INC. (203) 342-2747

### COMPUTERS

NORTH STAR	
*ADVANTAGE 64K-QD.....	\$3550
HRZ-2-64K-DD-ASM.....	\$CALL
HRZ-2-64K-QD-ASM.....	\$CALL
HEWLETT-PACKARD	
HP-85A.....	\$2795
HP-83A.....	\$CALL
ZENITH 2-89 ALL-IN-ONE-COMPUTER.....	\$2275
ATARI 800 16K.....	\$ 759
400 16K.....	\$ 345
COMMODORE BUSINESS MACHINES	
8032 LARGE 80 COLUMN SCREEN.....	\$CALL
CBM,PET COMPUTER 32K LIMITED TIME & QUANTITY.....	\$ 975
8050 DUAL FLOPPY DRIVE 1 MEG STORAGE.....	\$CALL
INTERTEC SUPERBRAIN 64K-DD.....	\$2775

### PRINTERS

DIABLO 630 LETTER QUALITY DAISY WHEEL PRINTER.....	\$CALL
NEC 7710/7730 LETTER QUALITY PRINTER.....	\$CALL
C.ITOH LETTER QUALITY PRINTER.....	\$1499
OLYMPIA ES-100 TYPEWRITER/PRINTER ALL INTERFACES AVAILABLE.....	\$1250
IDS PAPER TIGER 445G.....	\$CALL
460G.....	\$CALL
560G 132 COLUMN 15" PAPER.....	\$1150
ANADIX 9500/9501 132 COLUMN 15" PAPER.....	\$1290
EPSON MX-80 WITH FRICTION ATTACHMENT.....	\$CALL
MX-70.....	\$ 395
MX-100 132 COLUMN,15" PAPER,FRICTION & TRACTOR.....	\$CALL
OKIDATA MICROLINE 80.....	\$ 375
MICROLINE 83 132 COLUMN,15" PAPER,BI-DIRECTIONAL.....	\$ 750
VERBATIM DISKETTES	
525-01/10/16 (10 PER BOX).....	\$24.50
550-01/10/16 (10 PER BOX).....	\$37.50

### TERMINALS

TELEVIDEO 920C.....	\$ 850
950.....	\$1050
ZENITH Z19.....	\$ 820
INTERTUBE III OR EMULATOR.....	\$ 725
ZENITH 12" GREEN MONITOR.....	\$ 139
LEEDEX/AMDEK 100 GREEN MONITOR.....	\$ 165
ABOVE ITEMS MAY BE ORDERED BY MAIL OR PHONE. VISA AND MASTER CHARGE	
FACTORY SEALED, MANUFACTURERS WARRANTY. PRICES ARE SUBJECT TO CHANGE	

### Multi-Business Computer Systems Inc.

28 MARLBOROUGH STREET  
PORTLAND, CONN. 06480

M-F 9-6 SAT. 9:30-3:00

✓81 (203) 342-2747

TXW 710 428-6345



**APPLE II+  
48K RAM  
\$1199.00**

**ATARI 400  
16 K RAM  
\$339.00**

**CALL  
TOLL  
FREE**

APPLE PRODUCTS	LIST PRICE	OUR PRICE
Apple II+ 48K	\$1530	\$1199.
Apple Disk w/cont	\$645	\$549.
Apple Disk w/o cont	\$525	\$469.
Apple Pascal System	\$495	\$399.
Apple Integer Card	\$200	\$159.
Apple Centronics Card	\$225	\$189.
Apple H.S. Serial Card	\$195	\$159.
Apple Silentype Printer	\$395	\$349.
Apple Fortran	\$200	\$169.
Apple Pilot	\$150	\$125.
Apple Writer	\$75	\$60.
DOS Tool Kit	\$75	\$60.
Apple Plot	\$70	\$58.

Microsoft 280 Softcard	\$395	\$299.
Microsoft 16K Ram Board	\$195	\$179.
Microsoft Fortran	\$195	\$179.
Wordstar	\$350	\$259.

**CALL TOLL FREE  
800-633-1636**

C. ITOH EP1500-25 Letter Quality Printer	\$1595.00
EPSON MX-100 Printer	\$829.00
EPSON MX-70 Printer	\$369.00

EPSON MX-80 Printer	\$489.00
Hi-RES Software for EPSON MX-80	\$39.95
TYMAC PPC-100 Parallel Printer Card w/Cable	\$99.00

Sanyo 9 in B & W Monitor	\$179.00
Sanyo 12" B & W Monitor	\$249.00
NEC 12" Green Phosphor Monitor	\$259.00
TECO 12" Green Phosphor Monitor	\$159.00

ATARI PRODUCTS	LIST PRICE	OUR PRICE
Atari Basic	\$59.95	\$48.
Atari 400 16K	\$399.00	\$339.
Atari 800 16K	\$1080.00	\$799.
Atari 410 Recorder	\$89.95	\$69.
Atari 810 Disk Drive	\$599.95	\$499.
Atari 850 Interface	\$219.95	\$189.
Ram Cram 32K Board	\$399.00	\$199.
Printer Interface	\$69.95	\$59.95

**MEMORIX DISKETTES**  
Box of 10 with hub ring... **\$29. Box**

U-SCI DISK DRIVES FOR APPLE II	
DOS 3.2 & 3.3 Controller Card	\$99.
A40 40-Track Drive 163K	\$429.
A70 70-Track Drive 286K	\$549.

SOFTWARE FOR APPLE	
PFS Filing System	\$79.
PFS Report	\$79.
DB Master	\$189.
VISCALC 3.3	\$179.
BRODERBUND Payroll System	\$349.
CALL FOR PRICING ON SOFTWARE NOT LISTED	

We stock Hewlett Packard HP-83, HP-85, HP-41C and Accessories — **CALL FOR PRICES.**

Hayes Micromodem II	\$319.00
MNT Comp AID & DIA Board	\$299.00
MNT Comp Romplus Board	\$179.00
CPS Multi-Function	\$279.00

**OLENSKY BROS., INC.**  
COMPUTER SALES DIVISION

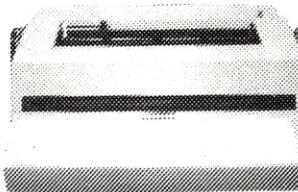
3763 AIRPORT BLVD. • MOBILE, ALA. 36608  
TOLL FREE 800-633-1636 • IN ALA (205) 344-7448



**RONDURE COMPANY** **the computer room**  
2522 BUTLER/DALLAS, TX. 75235 ✓74  
214-630-4621

**SPECIAL**

**Daisy Wheel Printer**  
Working—Parallel Interface  
**\$400.00** (Includes Power Supply)



**MICRO SWITCH KEYBOARD**  
USED BUT LOOKS VERY NICE

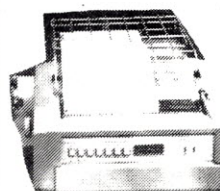


ASC II **\$40.00**  
(With Print)

**RS 232 CABLES**

8' RS 232 male/male—\$12.50  
15' RS 232 male/male—\$20.00  
25' RS 232 male/male—\$22.50  
50' RS 232 male/male—\$45.00

**GE TERMINET  
300 PRINTER**



Pin feed—9" paper

- 80 Print positions
- Receive only
- ASCII code
- RS 232 interface
- 10 CPS
- Upper & lower case
- Shipping wt 7 lbs
- Shipping containers \$15.00 (used)

Will run on serial RS232 port of most micros including TRS-80. **SALE \$395.00**

**FLAT-PACK  
ACOUSTIC  
Modem Pickup**



**USED FANS**

Muffin—\$8.00  
Sprite—\$6.00



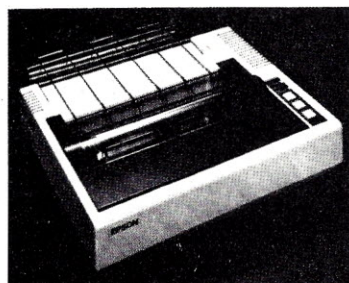
**USED OMNITEK**  
Orig. Only \$75.00

**ORDERING INFORMATION:**  
We ship the same day we receive a certified check or money order. Texas residents add 5% sales tax. Please call if you have a question. Write for our CATALOG of many parts, terminals, printers, etc. All items subject to availability. Your money returned if we are out of stock.

**SHIPPING INFORMATION:**  
Modems: \$3.00 each; Key Boards \$3.50, Power Supply \$8.00. Larger items & Parts: Specify Freight or Air Freight Collect. Foreign Orders: Add appropriate freight or postage. We now take Master Charge and Visa orders. Specify full number, bank number and expiration date.

**COOSOL DISCOUNTS** ✓292

**PRINTERS**



• Epson MX80	8541-0001, \$499 CALL
• Epson MX70	8341-0005, \$999 CALL
• Epson MX80/ GRAFTRAX	8541-8915, \$559 CALL
• Epson MX80 F/T	8641-0001, \$599 CALL
• Epson MX80 F/T GRAFTRAX	8541-0075, \$659 CALL
• Epson MX100	9624-0024, \$795 CALL
• Epson cables and cards	CALL
• NEC Spinwriter	5510-1 \$2495
• NEC Spinwriter	5515-1 \$2495
• NEC Spinwriter	5520-1 \$2880
• NEC Spinwriter	5525-1 \$2950
• NEC Spinwriter	5530-1 \$2495
• NEC Accessories	CALL
• ANACOM Parallel	ANC150P \$1195
• ANACOM SERIAL	ANC150S \$1195

\*Registered Trademark of Tandy Corporation.

\*\*FACTORY DIRECT

**CPU—TERMINALS—SOFTWARE**

**ADDS COMPUTER SYSTEMS**

• MULTIVISION 3, Step 3, 516-019000	\$11,275
• MULTIVISION 3, Step 2, 516-018000	\$10,172
• MULTIVISION 3, Step 1, 516-017000	\$ 9,070
• MULTIVISION 2	516-020000 \$ 7,520
• MULTIVISION 1	516-006000 \$ 3,312
• ADDS, ACCESSORIES & SOFTWARE	CALL

**ALTOS MTU/FLOPPY/HARDDISK**

• 8000-7MTU 1Mb/FL/17.2MT	\$12,118
---------------------------	----------

**HARD FLOPPY DISK**

208K RAM/S&P-10/10Mb 8" HARD DISK

• 1Mb FL/17.2 MT 8000-10MTU	\$ 9,616
• 1Mb Floppy 8000-10D	\$ 7,875
• 1/2Mb Floppy 8000-10	\$ 7,438
• ALTOS Accessories & Software	CALL

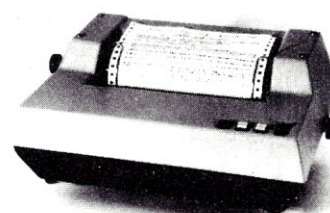
**TELEVIDEO TERMINALS**

• 910C	\$595	• 912C	\$705
• 920C	\$750	• 950C	\$959
• TELEVIDEO Accessories	CALL		

**NEC COMPUTER SYSTEMS**

• NEC Computer...PC-8001A	\$1,056
• NEC—I/O Unit...PC-8012A	\$ 626
• NEC—I/O Port...PC-8033A	\$ 152
• NEC—DISK DRIVE...PC-8031A	\$1,056
• NEC—DISK DRIVE...PC-8032A	\$ 931
• NEC—Gr. Monitor...JB-1201	\$ 220
• NEC—Col. Monitor...JC-1202	\$ 995
• NEC Accessories & Software	CALL

**\*\*COOSOL DATA LOGGER**



**TRACTOR FEED, 88 COLUMN**

- HEAVY DUTY—CONTINUOUS USE
- 5 X 7 UP TO 10 X 14 CHARACTER DOT MATRIX
- UPPER/LOWER CASE
- BIT PLOT GRAPHICS
- SERIAL AND PARALLEL INTERFACES

	Part No.	Price
Kit	101B-80KE	495
Assembled & Tested	101B-80E	\$545

**COOSOL 48 COLUMN PRINTERS  
ARE AVAILABLE AT \$355**

**COOSOL CABLES**

Parallel	\$29.00
Serial	\$29.00
TRS-80 Model I*	\$69.00

**COOSOL, INC.** P.O. BOX 743, ANAHEIM, CALIFORNIA 92805-0743 (714) 545-2216



# How Does the Apple III Stack Up?

By James E. Kelley, Jr.

About four months ago an Apple AIII (128K) took up residence in my engineering management consulting business, accompanied by a NEC Spinwriter (5515), a second disk drive and a black and white monitor.

I needed word processing for writing and indexing procedures manuals and for preparing technical reports and marketing materials. I also wanted program development capability for producing commercial-quality software packages. My other applications are proprietary, but are intended to exploit computer graphics and to involve top executives more personally in the use of microcomputers in their businesses.

A third application, the one my friends say is the real justification, is the analysis, comparison and classification of medieval marine charts—a long-standing interest of mine.

## The Bare Bones

What comes with the Apple III? There is an owner's guide with system utilities disk, a standard devices drivers manual with Apple II emulation disk, an Apple Business Basic reference manual with system disk, Apple II DOS manual with DOS 3.3 system master and DOS 3.3 BASIC disks, two VisiCalc manuals with sampler and system disks, a system demonstration disk and two blank disks.

---

*Address correspondence to James E. Kelley, Jr., 7602 Spring Ave., Melrose Park, PA 19106.*

---

That is not very much. But I knew in advance that I'd be a pioneer with the new machine, and would have a lot of development work to do.

When I placed my order last fall I expected to get Apple's word processor with the equipment. I understand delivery has been delayed until 1982! Since I really needed a word processor, my dealer recommended Muse Software's Supertext for the interim. This package was developed for Apple II, but fortunately it works under the emulator.

I have been using this word processing package for several months, and although it's doing the job, it's not something I want to live with forever. Using control characters for uppercase letters and other functions is certainly awkward, and it's inappropriate for the Apple III. I have to insert four disks just to get started each session. The package is unforgiving if you accidentally hit the wrong key under emulation, so frequent saves are your only insurance against redoing large blocks of text.

## Getting Started

With a little instruction from the dealer I started wading through the manuals. I soon found that you need to know something about the Apple II—the manual writers tacitly assume that the reader has experience with the earlier machine. Be sure to buy some of the Apple II manuals, especially the Applesoft and the Apple II

reference manuals.

One of the quickest ways to learn the fundamentals of this equipment is to print out and study a copy of the various BASIC programs that come on the demonstration and the Apple Business Basic disks. They are mostly well-documented with remarks. You can follow what they do by blocking off sections of the programs with END statements and then executing them. There are a number of demos in Integer and Applesoft BASIC on the DOS 3.3 system master which are also useful to print out and study.

There is a helpful Pascal subroutine (READCRT.INV) on the BASIC disk which reads the Text mode console screen. To my knowledge, none of the reference manuals tells how to do this, or even refers to this subroutine.

## Plaudits

I was concerned that reading screen text for long periods would bother my eyes, but this has not happened. I like the 80-character per line format, with upper- and lowercase letters. It is much superior to Apple II's 40-character format.

The Apple III provided my first experience with interactive programming. It's great—I've never written and debugged programs so rapidly. Every programmer should have this facility. Your debugged product can be compiled into machine language later on.



The edit feature is especially convenient. You can move the cursor all over the screen so you can assemble lines of coding from previously keyed material or insert corrections at will.

### Text and Program Manipulation

The string manipulation features of Apple II have been extended on the Apple III to include HEX\$ (decimal to hexadecimal conversion), TEN (hex to decimal), INSTR (first position of a substring) and SUB\$ (substring replacement). The related CONV(ert) commands, also new, permit all data-type conversions among real, integer, string and long integer expressions.

A really nice feature of the Apple Business Basic is the ability to LIST programs, or sections of them, to a Text file and then to read them back with an EXEC(ute) command. This lets the programmer manipulate programs within BASIC. For instance, I store useful subroutines as Text files, to be called when assembling a program by the appended utility, called PATCH, which is temporarily stored at high number-line positions. This utility rennumbers the subroutine and inserts it in the program being assembled (using the EXEC command). Indeed, PATCH itself is called as needed using the EXEC command, and then deleted when no longer needed.

Unfortunately, the LIST and DEL commands currently accept only explicit values of line numbers and not variables whose values can be substituted under program control. Further, the DEL command does not function in deferred mode, but requires direct operator involvement in utilities using it. The EXEC command works in deferred mode if the file pathname is placed in quotes (not mentioned in the manuals).

Since the EXEC command imitates keyboard input operation, the statements need not be in ascending sequence in the text file. This makes a limited form of numeric sorting possible. Generate BASIC REM statements, where the statement numbers are the sort keys, and the records or record identifiers are stored behind the REM. Distribute these statements to a text file and read back using an EXEC command. Voila! They are in sort order in the instruction memory. Now list them back to a text file and input them to a file for further processing under BASIC program control.

I have also used the program mem-

ory for dated text items (e.g., bibliographic references, follow-up notes). The date (or reasonable facsimile) provides the line number, a REM command avoids syntax tests, an additional digit or two provide a secondary classification (e.g., type of bibliographic item, individual involved or type of follow-up action), and finally the text in English (all in under 255 characters). This information is saved in a Text file, and read back using the EXEC command, to be updated just as you would correct a BASIC program using the cursor controls. A simple print program, selecting on the secondary classification if desired, provides up-to-date bibliographic or follow-up lists by individual or function.

### Quibbles

For an old FORTRAN programmer, the Apple Business Basic I/O statements are unnecessarily confusing and unwieldy. The use of INPUT/PRINT and READ/WRITE commands depends on the type of file addressed, and the punctuation of the variable list (commas and semicolons) varies with the device type. I'm forever making syntax errors. Handling of arrays during I/O is also inconvenient compared to FORTRAN. I'm not sure yet what strategy to follow in designing file layouts to get the best speed of operation. More information on how BASIC handles I/O commands internally would be helpful here.

A simple program listing requires

typing many characters, and I am forever doing it wrong. Here's the full sequence:

```
open#3,".printer":output#3:list:output#0:close#3:end.
```

I usually put this sequence at the end of my programs for easy call with a GOTO. I suppose these complications can be justified by the flexibility they provide—like the abominable JCL (job control language) of the IBM 360s and 370s.

In my shop, certain file numbers are standard, like standard device numbers on the old IBM systems (e.g., 1 = console [keyboard and screen], 3 = printer; 4 = graphics, etc.). When I pick up a piece of coding and read PRINT#3 I know automatically that the NEC Spinwriter is the device involved.

### Big Disappointment

My biggest disappointment being locked out of the system. No way is currently provided for programming in machine language. POKE, PEEK and CALL are not in Apple Business Basic's vocabulary. BASIC is fine for interactive operations at the console. But because it's interpretive, it's much too slow to exploit Apple III's intrinsic capabilities for number crunching, array handling or involved string manipulation. I like the idea of writing mainlines and most I/O and other overview functions in BASIC (for easy debugging at the console), while writing the inner loops (where time counts) in machine or a compiled language (e.g., Pascal,

#### Program listing. PATCH programming aid.

```
63000 REM *****
63005 REM * 5/29/81 VER 0.1 *
63010 REM * *** PATCH *** *
63015 REM * * *
63020 REM * An APPLE III Programmer's Aid *
63025 REM * *
63030 REM * Developed by: *
63035 REM * *
63040 REM * JAMES E. KELLEY, JR. *
63045 REM * Melrose Park, Penna. *
63050 REM * *
63055 REM * *
63060 REM *****
63065 DIM stnt$(200):GOTO 63620
63070 :
63075 REM *** PULL OUT STATEMENT # ***
63080 line$=""
63085 line$=line$+b$:IF a%=LEN(string$) THEN 63110
63090 a%=a%+1:b%=MID$(string$,a%,1)
63095 IF b$<"0" OR b$>"9" THEN 63110:ELSE 63085
63100 :
63105 REM *** CALC EQUIVALENT STMT # ***
63110 FOR i=1 TO lim:IF line$=stnt$(i) THEN 63120
63115 NEXT:nline$=line$:RETURN
63120 nline$=STR$(min+dif*(i-1)):RETURN
63125 :
63130 REM *** ASSEMBLE OUTPUT STRING ***
```

More



FORTTRAN).

Pascal, when it's available, is supposed to substitute for coding in machine language. Or perhaps it will provide the means to get directly at the 6502A and give the user true ownership and control of his equipment.

For me, being locked into BASIC exclusively means deferring the development of commercial-quality systems. The graphics die in BASIC. Image development is too slow for interactive graphics—rubber-banding and the like. At least I'm not smart enough to do these things effectively with the currently available facilities for Apple III.

### Glitches

Three valuable Applesoft program statements have been omitted in Apple Business Basic: FLASH (causes text to blink), ROT(ate) (a shape) and SCALE (a shape). SCALE is still in the vocabulary, but it now relates to formatting output for printing.

The first version of the BASIC system has serious bugs in the graphics package. When you use mode 2 (high-resolution) to plot data or to read the screen in the horizontal range of 512, the image is recorded in the range 256. I first encountered this when dumping a picture on the demonstration disk from the mode 2 buffer to the printer while experimenting with the NEC Spinwriter's graphics. I thought I had an error in my program. But the problem also arises when you plot curves on the high-resolution screen.

The Newfont and Drawimage features of the graphics package do not give correct results either. If you try the explanatory example in the manual you'll find this to be true.

### Comments on PATCH

PATCH is to be stored as a text file and called by the statement EXEC .D2/PATCH. It is read into memory without disturbing the program in residence unless it has statement numbers of 63000 or more. Enter PATCH with a GOTO 63000. The menu will be displayed (lines 63615-63675).

In operation, PATCH is pretty well self-explanatory. However, I'm sure it won't handle all possible error conditions, although those which I commonly make are programmed to give me a second chance.

Four working options are available in PATCH as currently written:

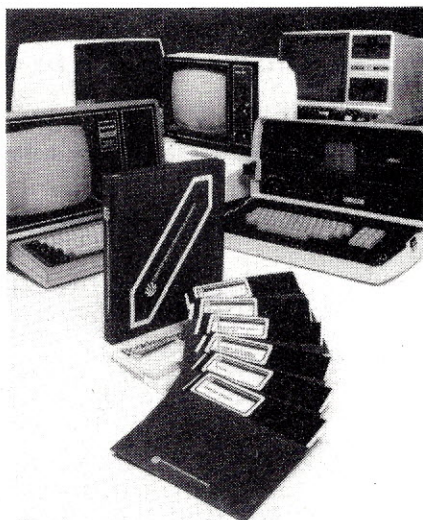
*Listing continued.*

```
63135 out$=LEFT$(string$,m%)+nline$:d%=LEN(string$)-m%-LEN(line$)
63140 IF d%<=0 THEN string$=out$:RETURN
63145 string$=out$+RIGHT$(string$,d%):RETURN
63150 :
63155 REM *** Process THEN, ELSE & USING ***
63160 a%=INSTR(string$,c$,i%):IF a%=0 THEN RETURN:REM No more THEN's
63165 b%=MID$(string$,a%+j%,1):IF b%<"0" OR b%>"9" THEN i%=a%+j%:GOTO 6316
0
63170 a%=a%+j%:m%=a%-1:GOSUB 63080:GOSUB 63135
63175 IF d%>j% THEN i%=LEN(string$)-d%:GOTO 63160
63180 RETURN
63185 :
63190 REM *** Process GOTO, GOSUB ***
63195 a%=INSTR(string$,c$,i%):IF a%=0 THEN RETURN:REM No more GOTO's
63200 b%=MID$(string$,a%+j%,1):IF b%<"0" OR b%>"9" THEN i%=a%+j%:GOTO 6319
5
63205 a%=a%+j%:m%=a%-1
63210 GOSUB 63080:GOSUB 63135
63215 IF d%<=0 THEN RETURN
63220 m%=m%+LEN(nline$)+1:b%=MID$(string$,m%,1)
63225 IF b%="," THEN a%=m%+1:b%=MID$(string$,a%,1):GOTO 63210
63230 IF d%>j% THEN i%=LEN(string$)-d%:GOTO 63195
63235 RETURN
63240 :
63245 REM *** MAIN LINE ***
63250 :
63255 INPUT#6:string$:IF LEN(string$)<=0 THEN PRINT#7:string$:GOTO 63255
63260 :
63265 REM Process STATEMENT #
63270 a%=1:line$="":GOSUB 63090:d%=LEN(string$)-LEN(line$)-1
63275 string$=blk$+nline$+RIGHT$(string$,d%)
63280 i%=1:c$="THEN":j%=5:GOSUB 63160:REM "THEN"
63285 i%=1:c$="ELSE":j%=5:GOSUB 63160:REM "ELSE"
63290 i%=1:c$="GOTO":j%=5:GOSUB 63195:REM "GOTO"
63295 i%=1:c$="GOSUB":j%=6:GOSUB 63195:REM "GOSUB"
63300 i%=1:c$="USING":j%=6:GOSUB 63160:REM "USING"
63305 PRINT#7:string$:GOTO 63255:REM Get next input string
63310 :
63315 REM *** INITIALIZE ***
63320 work$=".d2/renumworkfile":ON ERR GOTO 63450:CREATE work$, TEXT
63325 OFF ERR:lim%=200:qt$=CHR$(34):blk$=CHR$(32)
63330 PRINT:PRINT"Is Routine Currently in MEMORY (Y/N)";:INPUT q$
63335 jmp=1:IF q$="y" THEN jmp=2:x=1:GOTO 63470:REM Go CAPTURE Routine
63340 PRINT:PRINT"INPUT KEY Pathname of SOURCE Routine: ";name$
63345 :
63350 REM *** SET UP STMT$ TABLE ***
63355 i=1:ON ERR GOTO 63455
63360 OPEN#6 AS INPUT,name$:OFF ERR:ON EOF#6 GOTO 63375
63365 INPUT#6:string$:IF LEN(string$)<=0 THEN 63365
63370 a%=INSTR(string$,blk$,2):stmt$(i)=MID$(string$,2,a%-2):i=i+1:GOTO 6
3365
63375 CLOSE:OPEN#6 AS INPUT,name$
63380 ON EOF#6 GOTO 63530
63385 lim=i-1:OPEN#7 AS OUTPUT,work$
63390 ON ERR GOTO 63425
63395 PRINT:INPUT"KEY STARTING STATEMENT & STEP: ";min,dif:OFF ERR
63400 a=min+lim*dif:IF min<1 OR dif<1 THEN 63420
63405 IF min-INT(min)>0 OR dif-INT(dif)>0 THEN 63420
63410 IF a>63999 THEN PRINT:PRINT"New Line #'s EXCEED Capacity Limit of 63
999":GOTO 63390
63415 GOTO 63255
63420 PRINT:PRINT"POSITIVE Integers PLEASE!!":GOTO 63390
63425 PRINT:PRINT"Illegal Quantity":GOTO 63395
63430 :
63435 REM *** CLOSING ROUTINE ***
63440 CLOSE:PRINT"DONE -- RENUMBERED ROUTINE INSERTED"
63445 EXEC".d2/renumworkfile":END
63450 DELETE".d2/renumworkfile":GOTO 63320
63455 PRINT:PRINT;TAB(10);"<<< Pathname 'name$' does NOT Exist >>>":PRINT
:INPUT"Press ANY Key FOR MENU";q$:GOTO 63620
63460 :
63465 REM *** CAPTURE ROUTINE AS TEXT FILE ***
63470 n$=".d2/captureworkfile":ON ERR GOTO 63515
63475 CREATE n$, TEXT:OFF ERR:OPEN#8,n$
63480 s$="63505 list ":t$="del "
63485 GOSUB 63860
63490 PRINT:PRINT"EXECUTE the Following TWO Statements in IMMEDIATE Mode"
63495 PRINT:PRINT;s$:PRINT" goto 63500":PRINT CHR$(11);CHR$(11);CHR$(11);:
END
63500 OUTPUT#8
63505 LIST 63000 TO 63999
63510 OUTPUT#0:CLOSE#8:name$=n$:ON x GOTO 63355,63755,63840
63515 DELETE n$:GOTO 63470
63520 :
63525 REM *** CLOSING ROUTINE ***
```

More →



# ANNOUNCING A REVOLUTION IN THE COST OF PROFESSIONAL SOFTWARE



VISACCOUNT is a fully integrated business and accounting system designed for use in small businesses. VisAccount is extremely comprehensive and professional, yet it is very easy to use. The system is controlled from a series of interconnected menus permitting user-friendly operation. Everything you need to set-up and operate the system is provided with the VisAccount package.

ALL SYSTEMS is able to provide you VisAccount at this incredible low price because it runs on so many different machines. Through volume sales we are able to substantially reduce our prices.

**OUR GUARANTEE** — Buy both our software and that of our competitors (who will no doubt charge several times our price because they need to recapture their development cost). Compare the two systems and we know you'll return theirs (make sure they'll let you return their software). If you decide not to keep our system, then return it within 45 days for a full refund. Once you've used our system we're confident you'll be delighted.

†Microcomputers for Business Applications, 1979

## VISACCOUNT

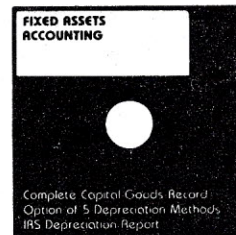
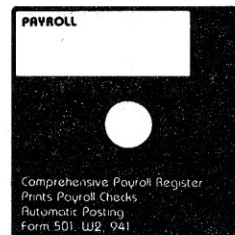
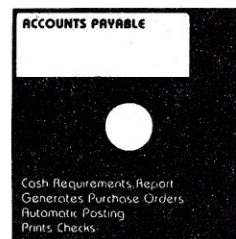
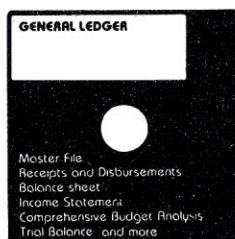
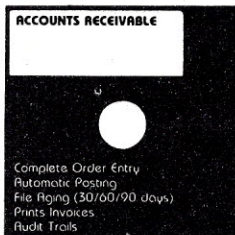
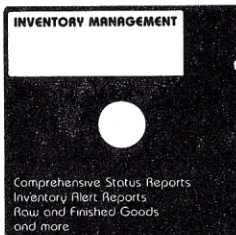
### What You Receive

- Nine 5¼" double density disks (or six 8" single density disks)
- Easy-to-use operator's manual (over 200 pages)
- Self-study guide on bookkeeping and accounting (over 180 pages)
- Cassette based instruction program on set-up and operation

Available for Apple\*, TRS-80, and most others

\*The Apple version requires the Microsoft Z80 softcard.

CSCA has CBASIC2, CP/M and Microsoft Z80 software in stock.



### EXTRA: MAILING LIST PROGRAM

#### Features

**Menu Driven:** The entire system runs from a single master menu which accesses numerous subsidiary menus, when needed, to perform the full spectrum of business and accounting functions.

**Self-Documenting:** All the information needed to use the system is provided in an easy to self-study format.

Requirements: 48K CBASIC2  
2 DISK DRIVES CP/M

### Send \$199 for the VISACCOUNT system



**ALL SYSTEMS** ✓ 182

a division of Computer Services Corporation of America

332 East 30th Street New York, New York 10016

Order Toll Free 1-800-221-2486

For New York and Technical Number 1-212-685-0090

Name \_\_\_\_\_

Address \_\_\_\_\_

City/State/Zip \_\_\_\_\_

☐ Master Charge ☐ Visa ☐ American Express

No. \_\_\_\_\_ Expires \_\_\_\_\_

Your System \_\_\_\_\_

Disk Size ☐ 5¼" double density ☐ 8" single density



*List Routine.* This can be done in unedited format as you would using the LIST command, or in edited format as the appended listing of PATCH illustrates. If many instructions are crammed into a single statement, you may have trouble getting wraparound on the printer, and difficulty reading the results when text and statement numbers appear in the same column position. The edited listing is obtained by capturing the program lines (asked for by PATCH) in a text file. They are then read back, edited and printed.

*Capture Routine as Text File.* Since this function is used as a subroutine for the other functions, I provided it as an option. I've used it for saving pieces of programs for editing as more general subroutines, or for saving information in DATA statements. *Extract, Renumber, Reinsert Routine.* This is the principle function of PATCH. Input routines may be in a text file on disk or already resident in memory; the program asks you to specify. If the routine is in memory you are asked to identify the lines (they need not be contiguous groups of statements). You are then asked to specify the new starting statement number and the stepping constant. The routine is renumbered and placed in a text file, and the program asks whether you want to rename that file for later use. It then asks if you want to load the renumbered routine into memory. If the routine was taken from the program in memory, you are asked if you want to first delete the lines from which it derived. If you elect to load the routine, you stop at an END statement.

Reinitiate PATCH if you want the menu for more operations. (EXEC uses the console, so there is confusion when PRINT statements are performed while EXEC is doing its thing.) In the other cases you get back to the menu automatically.

*Lines 63075-63455.* These lines cover the subroutines for renumbering statements, including substituting the proper new numbers in GOTOs, GOSUBs, etc. Each new statement to be processed is picked up in line 63255. Each case requiring a new number is identified in lines 63265-63300. Other cases might be added (e.g., LIST). The processed statement is transferred to disk in line 63305. Setting up to do the renumbering is done in lines 63320-63455.

*Lines 63465-63515.* Here is where specified statements are captured as

*Listing continued.*

```

63530 CLOSE:PRINT:PRINT"Renumbered Routine is TEXT File with Pathname ";wo
rk$
63535 PRINT:PRINT"Do you want to SAVE this Routine with a DIFFERENT Pathna
me (Y/N)";:INPUT q$
63540 IF q$="y" THEN 63555
63545 PRINT:PRINT"Do you want to LOAD "work$" (Y/N)";:INPUT q$
63550 IF q$="y" THEN 63575:ELSE 63620
63555 PRINT:PRINT"Key NEW Pathname for ";work$;:INPUT newname$:ON ERR GOTO
63570
63560 RENAME work$,newname$:OFF ERR
63565 SWAP work$,newname$:GOTO 63545
63570 PRINT:PRINT" <<< DUPLICATE or BAD Pathname - REPEAT >>>":GOTO 63
555
63575 ON jmp GOTO 63605,63580
63580 PRINT:PRINT"Do you want to DELETE the Captured Lines from Memory FIR
ST (Y/N)";:INPUT q$
63585 IF q$="n" THEN 63605
63590 PRINT:PRINT"EXECUTE the Following TWO Statements in IMMEDIATE Mode"
63595 PRINT:PRINT;t$:PRINT" goto 63605":PRINT CHR$(11);CHR$(11);CHR$(11);:
END
63600 DEL 1 TO 62999:REM Executed in IMMEDIATE Mode
63605 EXEC work$:END
63610 :
63615 REM *** DISPLAY MENU ***
63620 HOME:VPOS=5:PRINT; TAB(15);"PATCH MENU"
63625 PRINT:PRINT"1. LIST ROUTINE (Unedited)"
63630 PRINT:PRINT"2. LIST ROUTINE (Edited)"
63635 PRINT:PRINT"3. CAPTURE (Save) ROUTINE as TEXT File"
63640 PRINT:PRINT"4. EXTRACT, RENUMBER, REINSERT ROUTINE"
63645 PRINT:PRINT"5. QUIT"
63650 PRINT:PRINT; TAB(10);"< MAKE SELECTION >";:INPUT s
63655 IF s=<0 THEN 63620
63660 PRINT:PRINT"Press <RETURN> to do TASK #";s";:INPUT q$
63665 IF ASC(q$)<>-1 THEN 63620
63670 IF s>5 THEN PRINT"BYE!":END
63675 ON s GOTO 63690,63745,63835,63320
63680 :
63685 REM *** LIST ROUTINES ***
63690 PRINT:PRINT"ADJUST Printer and hit <RETURN>";:INPUT q$
63695 PRINT:PRINT"List WHOLE Program (Y/N)";:INPUT q$
63700 OPEN#3,".printer":IF q$="n" THEN 63710
63705 OUTPUT#3:LIST 1-62999:OUTPUT#0:GOTO 63620
63710 s$=" 63725 OUTPUT#3:LIST ":t$="":GOSUB 63860
63715 PRINT:PRINT"EXECUTE the Following TWO Statements in IMMEDIATE Mode"
63720 PRINT:PRINT;s$:PRINT" goto 63725":PRINT CHR$(11);CHR$(11);CHR$(11);:
63725 OUTPUT#3:LIST 1 TO 63999:REM Executed in IMMEDIATE Mode
63730 OUTPUT#0:CLOSE#3:GOTO 63620
63735 :
63740 REM *** EDITED LISTINGS ***
63745 PRINT:PRINT"ADJUST Printer and hit <RETURN>";:INPUT q$
63750 OPEN#3,".printer":page=1:x=2:GOTO 63470:REM Go CAPTURE Routine
63755 OPEN#8 AS INPUT,".d2/captureworkfile":ff$=CHR$(12):line=0:bb=0:sp$=C
HR$(32):bl$=sp$
63760 lf$=CHR$(10):cr$=CHR$(13):ON EOF#8 PRINT#3;lf$;cr$;:CLOSE:DELETE n$:
GOTO 63620
63765 PRINT#3;cr$;bl$;" Page "page";cr$;lf$;lf$;:page=page+1:line=line+2:
bl$=sp$
63770 INPUT#8;string$:aa=INSTR(string$," ",2)+1
63775 IF LEN(string$)>75 THEN 63795
63780 PRINT#3;cr$;lf$; SPC(bb+1);string$;:IF line<54 THEN 63790
63785 line=0:bl$=ff$:bb=0:GOTO 63765
63790 line=line+1:bb=0:GOTO 63770
63795 FOR i=76 TO 65 STEP-1
63800 a$=MID$(string$,i,1):IF a$<>" " THEN 63810
63805 NEXT i
63810 PRINT#3;cr$;lf$; SPC(bb+1);LEFT$(string$,i);:line=line+1:bb=aa
63815 IF LEN(string$)-i<0 THEN 63770
63820 string$=RIGHT$(string$,LEN(string$)-i):GOTO 63775
63825 :
63830 REM *** SAVE ROUTINE AS TEXT FILE ***
63835 x=3:GOTO 63470:REM Go CAPTURE Routine
63840 PRINT:INPUT"Key PATHNAME for the ROUTINE";newname$:ON ERR GOTO 63570
63845 RENAME n$,newname$:OFF ERR:GOTO 63620
63850 :
63855 REM *** LIST/DEL RANGE LIMITS ***
63860 PRINT:PRINT"Key FIRST Line # ";:INPUT l1
63865 PRINT:PRINT"Key SECOND Line # ";:INPUT l2
63870 IF l1>12 OR l1<0 OR l2>63999 THEN PRINT:PRINT" <<< ILLEGAL LINE #
'S - REPEAT >>>":GOTO 63860
63875 s$=s$+CONV$(l1)+ " to "+CONV$(l2)+":t$=t$+CONV$(l1)+ " to "+CONV$(l2
)+":n$:"
63880 PRINT"Any more Sections to Pull Out (Y/N)";:INPUT q$
63885 IF q$="y" THEN s$=s$+"list ":t$=t$+"del ":GOTO 63860
63890 RETURN

```



# OSI

# TRS-80

# COLOR-80

# OSI

**GALAXIAN - 4K** - One of the fastest and finest arcade games ever written for the OSI, this one features rows of hard-hitting evasive dogfighting aliens thirsty for your blood. For those who loved (and tired of) Alien Invaders. Specify system - A bargain at \$9.95 OSI

**LABYRINTH - 8K** - This has a display background similar to MINOS as the action takes place in a realistic maze seen from ground level. This is, however, a real time monster hunt as you track down and shoot mobile monsters on foot. Checking out and testing this one was the most fun I've had in years! - \$13.95. OSI

## THE AARDVARK JOURNAL

**FOR OSI USERS** - This is a bi-monthly tutorial journal running only articles about OSI systems. Every issue contains programs customized for OSI, tutorials on how to use and modify the system, and reviews of OSI related products. In the last two years we have run articles like these!

- 1) A tutorial on Machine Code for BASIC programmers.
- 2) Complete listings of two word processors for BASIC in ROM machines.
- 3) Moving the Directory off track 12.
- 4) Listings for 20 game programs for the OSI.
- 5) How to write high speed BASIC - and lots more -

Vol. 1 (1980) 6 back issues - \$9.00  
Vol. 2 (1981) 4 back issues and subscription for 2 additional issues - \$9.00.

## ADVENTURES!!!

For OSI, TRS-80, and COLOR-80. These Adventures are written in BASIC, are full featured, fast action, full plotted adventures that take 30-50 hours to play. (Adventures are interactive fantasies. It's like reading a book except that you are the main character as you give the computer commands like "Look in the Coffin" and "Light the torch".)

Adventures require 8K on an OSI and 16K on COLOR-80 and TRS-80. They sell for \$14.95 each.

## ESCAPE FROM MARS (by Rodger Olsen)

This ADVENTURE takes place on the RED PLANT. You'll have to explore a Martian city and deal with possibly hostile aliens to survive this one. A good first adventure.

## PYRAMID (by Rodger Olsen)

This is our most challenging ADVENTURE. It is a treasure hunt in a pyramid full of problems. Exciting and tough!

## TREK ADVENTURE (by Bob Retelle)

This one takes place aboard a familiar starship. The crew has left for good reasons - but they forgot to take you, and now you are in deep trouble.

## DEATH SHIP (by Rodger Olsen)

Our first and original ADVENTURE, this one takes place aboard a cruise ship - but it ain't the Love Boat.

## VAMPIRE CASTLE (by Mike Bassman)

This is a contest between you and old Drac - and it's getting a little dark outside. \$14.95 each.

## OSI NEW-NEW-NEW TINY COMPILER

The easy way to speed in your programs. The tiny compiler lets you write and debug your program in Basic and then automatically compiles a Machine Code version that runs from 50-150 times faster. The tiny compiler generates relocatable, native, transportable machine code that can be run on any 6502 system.

It does have some limitations. It is memory hungry - 8K is the minimum sized system that can run the Compiler. It also handles only a limited subset of Basic - about 20 keywords including FOR, NEXT, IF THEN, GOSUB, GOTO, RETURN, END, STOP, USR(X), PEEK, POKE, =, \*, /, <, >. Variable names A-Z, and Integer Numbers from 0-64K.

TINY COMPILER is written in Basic. It can be modified and augmented by the user. It comes with a 20 page manual.

TINY COMPILER - \$19.95 on tape or disk OSI

## SUPERDISK II

This disk contains a new BEXEC\* that boots up with a numbered directory and which allows creation, deletion and renaming of files without calling other programs. It also contains a slight modification to BASIC to allow 14 character file names.

The disk contains a disk manager that contains a disk packer, a hex/dec calculator and several other utilities.

It also has a full screen editor (in machine code on C2P/C4) that makes corrections a snap. We'll also toss in renumbering and program search programs - and sell the whole thing for - SUPERDISK II \$29.95 (5 1/4") OSI

## BARE BOARDS FOR OSI C1P

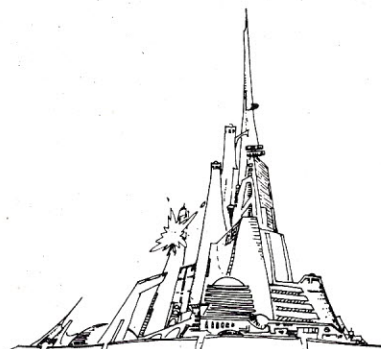
**MEMORY BOARDS!!!** - for the C1P - and they contain parallel ports!

Aardvarks new memory board supports 8K of 2114's and has provision for a PIA to give a parallel port! It sells as a bare board for \$29.95. When assembled, the board plugs into the expansion connector on the 600 board. Available now!

**PROM BURNER FOR THE C1P** - Burns single supply 2716's. Bare board - \$24.95.

**MOTHER BOARD** - Expand your expansion connector from one to five connectors or use it to adapt our C1P boards to your C4/8P. - \$14.95.

**16K RAM BOARD FOR C1P** - This one does not have a parallel port, but it does support 16K of 2114's. Bare Board \$39.95.



**Please specify system on all orders**

This is only a partial listing of what we have to offer. We offer over 120 games, ROMs, and data sheets for OSI systems and many games and utilities for COLOR-80 and TRS-80. Send \$1.00 for our catalog.

**AARDVARK TECHNICAL SERVICES, LTD.**  
2352 S. Commerce, Walled Lake, MI 48088  
(313) 669-3110

✓91

## WORD PROCESSING THE EASY WAY - WITH MAXI-PROS

This is a line-oriented word processor designed for the office that doesn't want to send every new girl out for training in how to type a letter.

It has automatic right and left margin justification and lets you vary the width and margins during printing. It has automatic pagination and automatic page numbering. It will print any text single, double or triple spaced and has text centering commands. It will make any number of multiple copies or chain files together to print an entire disk of data at one time.

MAXI-PROS has both global and line edit capability and the polled keyboard versions contain a corrected keyboard routine that make the OSI keyboard decode as a standard typewriter keyboard.

MAXI-PROS also has sophisticated file capabilities. It can access a file for names and addresses, stop for inputs, and print form letters. It has file merging capabilities so that it can store and combine paragraphs and pages in any order.

Best of all, it is in BASIC (OS65D 51/4" or 8" disk) so that it can be easily adapted to any printer or printing job and so that it can be sold for a measly price.

MAXI-PROS - \$39.95. Specify 5 1/4 or 8" disk.

## SUPPORT ROMS FOR BASIC IN ROM MACHINES

C1S/C2S. This ROM adds line edit functions, software selectable scroll windows, bell support, choice of OSI or standard keyboard routines, two callable screen clears, and software support for 32-64 characters per line video. Has one character command to switch model 2 C1P from 24 to 48 character line. When installed in C2 or C4 (C2S) requires installation of additional chip. C1P requires only a jumper change. - \$39.95

C1E/C2E similar to above but with extended machine code monitor. - \$59.95 OSI

## ARCADE GAMES FOR OSI, COLOR-80 AND TRS-80 (8K OSI, 16K TRS-80 AND COLOR-80)

**TIMETREK - A REAL TIME, REAL GRAPHICS STARTRECK.** See your torpedoes hit and watch your instruments work in real time. No more unrealistic scrolling displays! \$14.95.

**STARFIGHTER** - This one man space war game pits you against spacecruisers, battlegroups, and one man fighters, you have the view from your cockpit window, a real time working instrument panel, and your wits. Another real time goody. \$9.95

**BATTLEFLEET** - This grown up version of Battleship is the toughest thinking game available on OSI or 80 computers. There is no luck involved as you seek out the computers hidden fleet. A topographical toughie. \$9.95

**QUEST - A NEW IDEA IN ADVENTURE GAMES!** Different from all the others, Quest is played on a computer generated map of Alesia. Your job is to gather men and supplies by combat, bargaining, exploration of ruins and temples and outright banditry. When your force is strong enough, you attack the Citadel of Moorlock in a life or death battle to the finish. Playable in 2 to 5 hours, this one is different every time. 16K COLOR-80 OR TRS-80 ONLY. \$14.95



OSI



COLOR-80



## Is your micro your terminal too?

**T**hen you already know it's hard to find a single source of information about microcomputer telecommunications. The hardware, the software. And what makes it tick.

**T**hat's what the On-Line Computer Telephone Directory is all about! News, reviews, and more than 200 listings of free-access microcomputer bulletin boards throughout North America.

**S**ubscribe today. 1 year, \$9.95; 2 years, \$15.95. Get the most out of your microcomputer with The On-Line Computer Telephone Directory (a quarterly publication).

**The On-Line Computer  
Telephone Directory**  
P.O. Box 10005  
Kansas City, MO 64111

✓ 356

## SIEMENS FLOPPY DISK SALE!

■ We are an OEM for SIEMENS disk drives, and have we got a deal for you! Floppy Disk Services is selling the latest and greatest disk drives direct to you at prices you can't find anywhere else. We buy in big quantities to set the best prices and pass that savings on to you.

■ Looking for 8" drives? The FDD-100-8 is the latest most updated model from SIEMENS. Single sided single or double density. These drives are built on tough chassis for years of trouble free use. They are rack mountable and Shugart compatible, both physically and electrically. Power requirements are simple just +24v and +5v, negative voltage not required. The motor is A.C. driven.

■ Need 5.25" drives? The FDD-100-5 is for you. These drives are 35 or 40 track models and like their big brothers are the latest models from SIEMENS. They work perfectly with the TRS-80 Mod 1 and are direct replacements for the drives used in Heath computers. Powered by just +12 and +5vdc.

ask about our 8" dual drive package for  
TRS-80 MOD II — \$995.00  
for TWO drive system

FDD-100-8d.....\$360.00 each  
FDD-100-5b.....\$250.00

power conn. set 8".....\$3.50

Manuals (8" or 5.25")....\$13.00

8" package requires some assembly.

All shipping via U.P.S. rates.

Prices & Specs subject to change.

✓ 191

**Floppy Disk Services Inc.**  
C.N. 5212



Princeton, N.J. 08540  
(609) 771-0374



a text file. Line 63505 is created in line 63495 by printing it followed by a GOTO (to get back into PATCH again). You are instructed to execute the two lines from the console by running the retype key (right arrow) over them individually, hitting return each time.

**Lines 63525-63605.** Here are some miscellaneous subroutines used at the end of a renumbering exercise. Particularly note that line 63600, which deletes the lines extracted from the resident program, is set up on the console for execution in Immediate mode (as with line 63505, and again in line 63725).

**Lines 63685-End.** The listing options are managed here. The width of a printed line is controlled in line 63775; control of lines per page is in line 63780.

For accommodating smaller memories there are numerous ways to reduce the size of PATCH, an exercise I will leave to the interested programmer. Other functions might be added to this utility, such as compressing the number of line numbers or copying individual files from one disk to another. ■

## CONVERT YOUR SERIAL PRINTER TO PARALLEL

NEW MODEL UPI-3 SERIAL PRINTER INTERFACE MAKES IT POSSIBLE TO CONNECT AN ASCII SERIAL PRINTER TO THE PARALLEL PRINTER PORT ON THE TRS-80.

Software compatibility problems are totally eliminated because the TRS-80 "THINKS" that it has a parallel printer attached. NO MACHINE LANGUAGE DRIVER NEEDS TO BE LOADED INTO HIGH MEMORY BECAUSE THE DRIVER ROUTINE FOR THE UPI-3 IS ALREADY IN THE TRS80 ROM! SCRIPSIT, PENCIL, RSM 2, ST80D, NEWDOS, FORTRAN, BASIC etc. all work as if a parallel printer was in use.

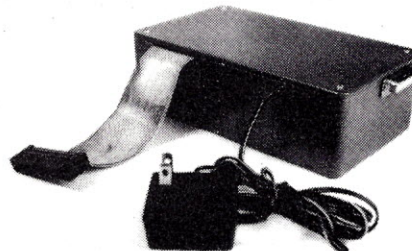
The UPI-3 is completely self contained and ready to use. A 34 conductor edge card connector plugs onto the parallel printer port of the model I Expansion Interface or onto the parallel printer port on the TRS-80 III. A DB25 socket mates with the cable from your serial printer. The UPI-3 converts the parallel output of the TRS-80 printer port into serial data in both the RS232-C and 20 MA. loop formats.



**SPEEDWAY ELECTRONICS** ✓ 229  
Division of Binary Devices  
11560 TIMBERLAKE LANE  
NOBLESVILLE, IN 46060  
(317) 842-5020

TRS 80 is a trademark of Tandy

VISA MasterCard



Switch selectable options include:

- Linefeed after Carriage Return
- Handshake polarity (RS232-C)
- Nulls after Carriage Return
- 7 or 8 Data Bits per word
- 1 or 2 Stop Bits per Word
- Parity or No parity
- ODD or EVEN Parity

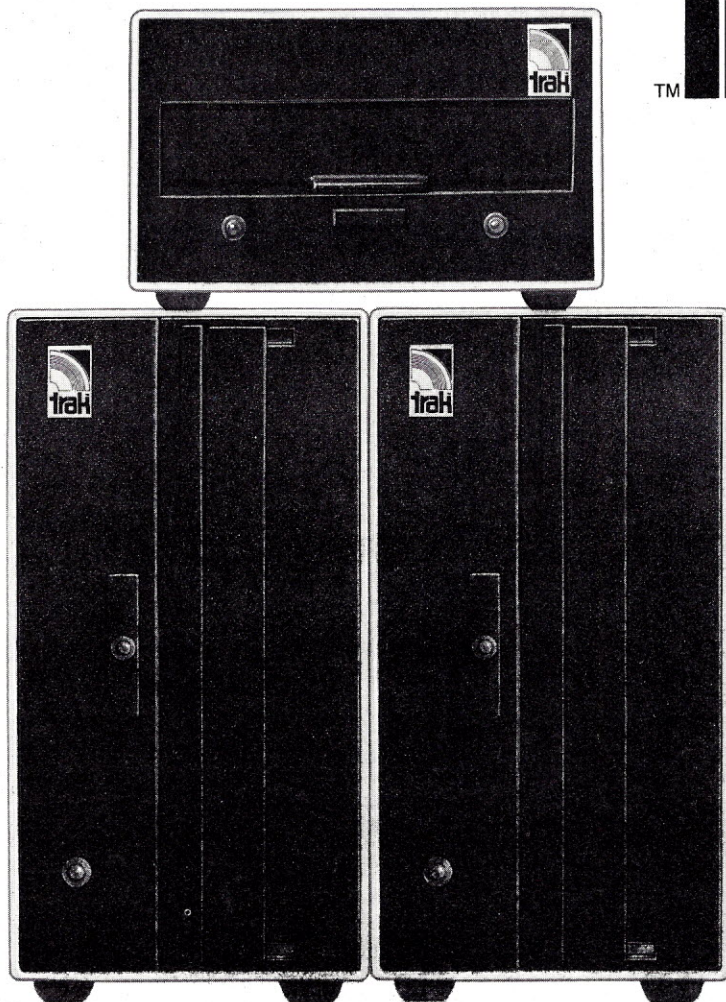
**NOW  
AVAILABLE  
FOR  
MODEL II**

UPI-2 for TRS80 Model II	\$149.95
UPI-3 for TRS80 Model I or 3	\$149.95
UPI-4 for use with Model 1 and RS Printer	
Interface Cable (no expansion interface required)	\$159.95
Manual only (may be applied to order)	\$ 5.00
Ten day return privilege — 90 day warranty	
Shipping and Handling on all orders	\$ 4.00
Specify BAUD rate 50-9600 BAUD	



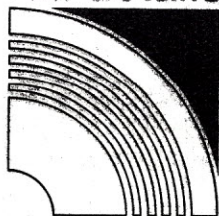
Get on the right **trak**  
in floppies with new

**trak** 5¼" & 8"  
disk drives



**5¼" from \$399 list**  
**8" from \$899 list**

For the name of your nearest dealer and full details, Call Toll-Free 1-800-323-4853



or write:

**trak** 398

International inquiries invited.  
Dealerships available.

microcomputer corp.

1511 Ogden Ave., Downers Grove, IL 60515

® TRS-80 is a registered trademark of Radio Shack, a Tandy Company  
® Apple II is a registered trademark of the Apple Computer Company

**TRAK — the way to go — in floppy disk drives.**

Whether you are just setting up your computer system, expanding it, or re-equipping — make it TRAK.

With TRAK you get the finest of industry-standard disk drives, custom electronics and custom cabinetry. In your choice of office beige or silver gray. And other options like door locks, front bezels, write-protect switch, extender card and more.

**Drives with the industry's fastest access time** — from 3 to 5 ms. With up to 9200 hours MTBF. 40, 77, 80 track. Single or double density. Single or double sided. Up to 1.6 Mega-Byte capacity. Single, dual or triple cabinets. With or without power supplies. And a TRAK exclusive — dual LED panel indicators for Power-On and In-Use. Convenient — as you know if you've ever left things "on" for long periods without realizing it. Compatible with TRS-80®, Heath/Zenith, Northstar, Apple II® and most S-100 based systems.

**Custom electronics** — custom transformers — for 110VAC or 220VAC, 50 or 60 Hz. Fused for protection. With regulation for low ripple and constant output even with input variation. Quiet convection cooling through vents on all cabinet sides without the need of noisy, bothersome fans.

**Low prices.** Complete 5¼" drives list as low as \$399, complete 8" drives as low as \$899 list. And your TRAK dealer gives you the best of everything — in price and service, in or out of warranty. Standard TRAK warranty is 90 days; 12 month extension available at extra cost. Check your dealer now for the right TRAK in disk drives — TRAK.

\$25

**INTRODUCTORY  
FACTORY REBATE**

\$25

Buy from your TRAK dealer, then mail copy of sales receipt with TRAK serial number and this coupon to TRAK. We will rebate \$25 direct to you as our way of welcoming you to the TRAK drive family.

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_

Zip \_\_\_\_\_

Offer expires Nov. 30, 1981. Limit one rebate per customer. Offer void where prohibited.



With this H89 program that generates professional-looking order forms, all you have to do is sign the form and send it in.

# Made-to-Order Business Forms

By Marilyn H. Deibert

**F**orms is designed to make a professional-looking order form, ready for mailing. Although the program is written for the Heath H-89, it can, with minor modifications, be used with any computer-printer combination. The screen graphics are used to enhance the input of data and can be deleted with no ill effects to the program.

The program has the following features:

- Entry of "ship to" address.
- If the "charge to" address is different than the "ship to" address, it can be entered.
- Entry of your invoice number.
- Entry of vendor name and address.
- Entry of various methods of payment (bank card, check, etc.).
- Entry of various types of shipping charge rates (flat rate, percentage of order or none).
- Entry of tax rate if applicable.
- Entry of specific method of shipment (UPS, Bestway, etc.).
- Error correction of entries prior to printing. Entries can be changed or additional entries can be made as an afterthought.
- Entry of 18 items to a form.
- Complete interaction between the user and the computer.

The question/answer format makes the program easy to use. After the printer has typed the form, you need only to sign it if a bank card is used, and then mail it.

## Using the Program

To use the program, the only part of the run that may need clarification

Address correspondence to Marilyn H. Deibert,  
HQ DMMC 1 AD, APO, NY 09068.

ROCK COMPONENTS  
P.O. BOX 234  
DENVER COLO. 99999

DATE 10/29/80

INVOICE # A00102

CHARGE TO MARILYN DEIBERT  
431 DUNMORE RD.  
FAYETTEVILLE NC 28303

SHIP TO GLEN DEIBERT  
HQ DMMC 1 AD  
APO NY 09068

PHONE NO. 919-867-8679

SHIPPED	QTY	PART #	DESCRIPTION	U/C	E/C	REMARKS
	1	4001	C/MOS	0.350	0.35	
	1	1488	RS-232 INTERFACE	1.400	1.40	
	5	21L02	MEMORY CHIP(400MSEC)	0.990	4.95	
	3	2M3820	P FET	0.450	1.35	
	1		ITAL 2.000 MHZ	3.450	3.45	
	5	7400	TTL IC	0.170	0.85	
	5	7404	TTL IC	0.240	1.20	
	1	MMS387AA	CLOCK CHIP	5.950	5.95	
	2		.22UF 35V TANTCAP	0.200	0.40	
	1		FULL WAVE BRIDGE 2A/600	1.300	1.30	
	1	S11050650	AUDIO POWER AMP	26.900	26.90	
	1		16K MEM EXP KIT(TRS-80)	58.000	58.00	
	10		RESISTOR 10K 1%	0.065	0.65	

SHIP VIA BEST WAY...PAL

METHOD OF PAYMENT CARD

VISA CARD # 765-4567-980-4321

EXPIRATION DATE 10/83

SIGNATURE.....

TOTAL 106.95

SHIPPING/HANDLING 3.00

TOTAL OF ORDER 109.95

Sample run of the Forms program.

The Forms program listing, written for the Heath H-89.

```
100 REM ORDER FORM
110 REM*****FORMS*****
120 MARILYN H. DEIBERT
130 REM HQ DMMC 1 AD APO NY 09068
140 REM 2 SEPT 1981
150 REM
160 L$=CHR$(10):REM LINE FEED
170 CLEAR500
180 REM
190 REM SETS EDITING
200 U$="*****.##":U1$="*****":U2$="*****.###"
210 REM
220 REM SETS GRAPHIC PARAMETERS
230 E$=CHR$(27):E1$=E$+"E":F$=E$+"F":G$=E$+"G":Y$=E$+"Y":J$=E$+"J":K$=E$+"K":L$=E$+"L":V1$=E$+"V"
240 REM
250 PRINTL$:PRINTG$
260 PRINT"THIS PROGRAM WILL ALLOW THE ENTRY OF ITEMS FOR PRINTING OF PURCHASE ORDERS.:"
270 PRINT" THE ENTRIES AVAILABLE ARE QUANTITY, DESCRIPTION, PART NUMBER & UNIT COST.:"
280 PRINT:PRINT"THE EXTENDED PRICE WILL BE POSTED TO THE APPROPRIATE COLUMN ON THE CRT.:"
```

More



Program listing continued.

```

290 PRINT" AFTER ALL ENTRIES ARE ENTERED, VERIFY THEIR ACCURACY AND MAKE ANY NECESSARY
CORRECTIONS."
300 PRINT:PRINT"WHEN YOU HAVE COMPLETED ALL ENTRIES, ENTER A '0' WHEN THE QUANTITY IS REQUESTED."
310 PRINT"THEN MAKE THE PRINTER READY AND THE INFORMATION WILL BE PRINTED FOR YOU."
320 PRINT:PRINT:INPUT"PRESS 'RETURN' TO CONTINUE."
330 PRINT:
340 DIM A(20,3),A$(20,2)
350 REM INPUT ADDRESS DATA
360 REM
370 INPUT"TODAY'S DATE (MM/DD/YY) "
380 INPUT"SHIP TO NAME"
390 PRINT:PRINT:INPUT"STREET ADDRESS"
400 PRINT:PRINT:INPUT"CITY STATE ZIP CODE "
410 PRINT:PRINT:INPUT"ENTER YOUR PHONE # (999-999-9999) "
420 PRINT:PRINT:INPUT"ENTER YOUR INVOICE NUMBER "
430 REM PAYEE DIFFERENT FROM SHIP TO
440 PRINT:PRINT"IS THE PAYEE NAME & ADDRESS THE SAME AS THE SHIP TO (Y/N) "
450 IFQ$="N" THEN PRINT: INPUT"PAYEE NAME "
460 LINEINPUT"PAYEE CITY STATE ZIP CODE "
470 REM
480 REM INPUT VENDOR ADDRESS
490 PRINT:PRINT:PRINT:INPUT"VENDOR NAME"
500 PRINT:PRINT:PRINT:INPUT"VENDOR STREET ADDRESS"
510 PRINT:PRINT:PRINT:INPUT"VENDOR CITY STATE ZIP CODE "
520 PRINT:PRINT:INPUT"MODE OF SHIPMENT (UPS,BEST WAY ETC.) "
530 REM
540 PRINT:
550 REM
560 REM ALLOWS SELECTION OF PAYMENT
570 REM
580 PRINT:INPUT"METHOD OF PAYMENT (M.O.,CHECK, CARD C.O.D.) "
590 IF P$="CARD" THEN PRINT:INPUT"WHAT TYPE CARD (VISA,MASTER CHG, ETC.) "
600 IF P$="CARD" THEN PRINT: INPUT"WHAT IS YOUR CARD NUMBER "
610 PRINT:IF P$="CARD" THEN INPUT"EXPIRATION DATE (MM/YY) "
620 REM
630 REM SETS TABLE SIZE
640 REM
650 REM
660 PRINTY$=PRINTG$:REM CLEARS GRAPHICS
670 REM
680 PRINT: : REM CLEARS SCREEN
690 REM SETS UP CRT FOR INPUT
700 PRINT" QTY";TAB(12);"PART #";TAB(28);"DESCRIPTION";TAB(49);"U/C";TAB(59);"E/C"
710 PRINTF$;
720 REM
730 REM BUILDS FORM ON CRT
740 PRINT"aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa"
750 FORX=1TO18
760 PRINT"";TAB(6);"";TAB(21);"";TAB(45);"";TAB(56);"";TAB(66);""
770 NEXTX
780 PRINT"aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa"
790 FORX=1TO18
800 PRINTJ$;
810 REM
820 REM POSITIONS CURSOR FOR PRINTING
830 REM
840 INPUT"ENTER QUANTITY ('0' IF DONE) "
850 IF A=0 THEN 1060 ELSE 860
860 A(X,1)=A
870 PRINTY$;CHR$(34+X);CHR$(33);USINGU1$;A(X,1)
880 PRINTK$;L$;
890 INPUT"PART NUMBER "
900 PRINTY$;CHR$(34+X);CHR$(39);A$(X,1)
910 PRINTK$;L$;
920 INPUT"DESCRIPTION "
930 PRINTY$;CHR$(34+X);CHR$(54);A$(X,2)
940 PRINTK$;L$;
950 INPUT"ENTER UNIT COST "
960 A(X,3)=A(X,1)*A(X,2)
970 PRINTY$;CHR$(34+X);CHR$(78);USINGU2$;A(X,2);PRINTK$;L$;PRINTY$;CHR$(34+X);CHR$(89);USINGU$;A(X,3);PRINTK$;L$;
980 REM COUNTER FOR NUMBER OF ENTRIES
990 CR=CR+1
1000 IFCR=18 THEN PRINT"THERE IS A LIMIT OF 18 ITEMS PER ORDER."
1010 NEXTX
1020 PRINTG$
1030 REM
1040 REM SHIPPING AND HANDLING ROUTINE
1050 REM
1060 FORX=1TOCR:A4=A4+A(X,3);NEXTX;GOSUB1700:REM TOTAL OF ORDER
1070 PRINT:PRINT"TOTAL OF ORDER";TAB(20);USINGU$;A4
1075 PRINT:INPUT"DO YOU WANT TO MAKE A COMMENT ON THE ORDER FORM (Y/N) "
1077 IF R$="N" THEN R$=""
1080 PRINT:INPUT"SHIPPING/INSURANCE CHARGE (F=FLAT RATE, P=% OF ORDER, N=NONE) "
1090 REMSETS UP SHIPPING/HANDLING AND TAXES
1100 IFC2$="N" THEN 1140
1110 IFC2$="F" THEN 1120 ELSE 1130

```

More

is the error correction routine. After all data has been initially entered, a summary of the order will be displayed. At this time the entries may be corrected, added to or left as they are for printing. There are three choices for the user—OK to indicate that all is correct, C to indicate that a change is needed or A to indicate that another entry is needed.

If C is entered, the line for correction is requested. After entering the line number, the question QUANTITY will appear. If the quantity is to be changed, enter the change; otherwise, press enter and the PART # question will appear. Again, if it is all right, enter a return or enter the correct information. All other line entries are similar—if it is OK, press return or enter corrected data.

If you wish to delete a line of data, again enter the line number. On each question, enter a space and then a return. The space will take the place of the deleted item and will not be printed on the printer, but will show on the CRT as zeroes for entries to show that a line has been deleted.

The program will accept 18 entries. This number is determined by the screen size and the way the data is entered. Line number 790 sets this limit for the CRT and line 1470 sets the page size for the printer (22 lines in this case).

The program lets you add up to 255 characters for comments to order forms. It is available from the author for \$5. Include a formatted H-89 disk.

## INVENTORY CONTROL SYSTEM for **OHIO SCIENTIFIC**

Runs under OS-65U — Either floppy or hard disk systems. Single user or Level 3 timesharing — Uses OS-DMS format files (except BOM)

**Complete with:** sources, flowchart, manual, disk storage requirements, how to load files and sample reports.  
**INTELLIGENT BILL OF MATERIAL** (BOM format file has linked-list structure)  
**STOCK STATUS REPORT** (This is a perpetual inventory)

**Other reports:** purchase trail, sales order, purchases, item sales, purchase order, vendor, customer, and more.

299 **\$1,495**

**Computer Components Corporation**

2449 Camelot Court, S.E.  
Grand Rapids, MI 49506 (616) 942-5063



If you're looking for  
the best prices  
in the U.S.A. on



## TRS-80 MICROCOMPUTERS

We have consistently offered the TRS-80 line at savings up to 20%. You can save up to \$1500 by buying from Computer Discount of America.

**Model II**  
26-4002 64K, 1 disc \$3385.00

**Model III**  
26-1061 4K, Level I \$ 610.00  
26-1062 16K, Level III \$ 845.00  
26-1066 48K, Level II 2-drive/RS-232 \$2115.00

**Color Computer**  
26-3001 4K \$ 325.00  
26-3002 16K w/Ext. Basic \$ 489.00

**EPSON**  
MX70 Printer \$ 375.00  
MX80 Printer \$ 485.00  
MX80FT Printer \$ 585.00

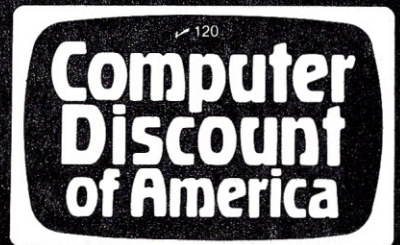


We have the full line of ATARI personal computers and systems.

Our savings are as big on expansion interfaces, printers, diskettes, Apple Computers, OKIDATA Microliner, C-ITOH Starwriter, Lexicon Modems — everything for your computer.

We have the largest inventory in the Northeast, and most models are in stock, for immediate delivery. Our full price catalog or a price quote is as near as your phone.

**CALL TOLL FREE:**  
**800-526-5313**



COMPUTER DISCOUNT OF AMERICA, INC.  
15 Marshall Hill Road, West Milford Mall  
West Milford, New Jersey 07480-2198  
In New Jersey Call 201-728-8080

Program listing continued.

```

1120 PRINT:INPUT"FLAT RATE":C2:GOTO1140
1130 PRINT:INPUT"PERCENTAGE":C2:C2=C2+A4
1140 PRINT:INPUT"ENTER TAX RATE (.05=5%):IF APPLICABLE":A6
1150 A5=A4+A6:REM COMPUTES TAX
1160 REM
1170 PRINT E$+"Z":REM SETS ALL PARAMETERS BACK TO NORMAL
1180 REM
1190 REM PRINT ROUTINE FOR PRINTER
1200 REM
1210 PRINT:INPUT"IS THE PRINTER READY? PRESS RETURN WHEN READY.":W$
1215 IF W$="Y" THEN 1210
1220 REM OPENS LINE PRINTER FILE
1230 OPEN "O",1,"LP:"
1240 PRINT#1,E$;CHR$(30)
1250 PRINT#1,TAB(50);"DATE ":Y4$
1260 PRINT#1,N1$
1270 PRINT#1,S1$
1280 PRINT#1,Z1$;PRINT#1,TAB(90);"INVOICE # ":I$
1290 FOR X=1 TO 5:PRINT#1,L$:NEXT X
1300 PRINT#1,"CHARGE TO ":P7$;TAB(44);"SHIP TO ":N$;TAB(90);"PHONE NO. ":PA$
1310 PRINT#1,TAB(12);P8$;TAB(53);S$
1320 PRINT#1,TAB(12);P9$;TAB(53);Z$
1330 PRINT#1,L$:PRINT#1,L$:FOR X=1 TO 120:PRINT#1,"-":NEXT X
1340 PRINT#1,L$
1350 PRINT#1,"SHIPPED":TAB(12);"QTY":TAB(25);"PART #":TAB(55);"DESCRIPTION":TAB(89);"U/C":TAB(101);"E/C":TAB(110);"REMARKS"
1360 FOR X=1 TO 120:PRINT#1,"-":NEXT X
1370 PRINT#1,L$
1380 FOR X=1 TO CR
1390 IF A(X,1)=0 THEN 1460:REM DON'T PRINT DELETED ITEM
1400 REM PRINTING DATA ON FORM
1410 PRINT#1,TAB(12);USINGU$;A(X,1);
1420 PRINT#1,TAB(26);A(X,1);TAB(56);A(X,2);
1430 PRINT#1,TAB(85);USINGU2$;A(X,2);
1440 PRINT#1,TAB(98);USINGU$;A(X,3)
1450 H=H+1
1460 NEXT X
1470 A9=22-H
1475 PRINT#1,L$:PRINT#1,R$
1480 FOR X=1 TO A9:PRINT#1,L$:NEXT X
1490 PRINT#1,L$:FOR X=1 TO 120:PRINT#1,"-":NEXT X
1500 PRINT#1,L$
1510 PRINT#1,"SHIP VIA ":M$;
1520 PRINT#1,TAB(90);"TOTAL":TAB(98);USINGU$;A4
1530 IF A5=0 THEN PRINT#1,TAB(90);"TAX":TAB(98);USINGU$;A5
1540 PRINT#1,"METHOD OF PAYMENT ":P$;
1550 PRINT#1,TAB(80);"SHIPPING/HANDLING":TAB(98);USINGU$;C2
1560 C3=A4+C2+A5:REM C3=TOTAL OF ORDER, A4=AMOUNT OF ORDER, C2=SHIP/HAND, A5=TAX
1570 PRINT#1,TAB(80);"TOTAL OF ORDER":TAB(98);USINGU$;C3
1580 IF P$="CARD" THEN PRINT#1,P1$;"CARD # ":P2$;PRINT#1,"EXPIRATION DATE ":N2$
1590 PRINT#1,L$:PRINT#1,"SIGNATURE....."
1600 REM
1610 PRINT#1,CHR$(12);REM TOP OF NEW PAGE
1620 CLOSE#1:A4=0
1630 REM
1640 INPUT"DO YOU WANT TO MAKE ANOTHER ORDER (Y/N)":Q$;IF Q$="Y" THEN 1650 ELSE 1660
1650 C2=0:A6=0:ERASE A:ERASE A$;GOTO330
1660 END
1670 REM
1680 REM SUMMARIZES ORDER FOR ACCURACY CHECK AND ERROR CORRECTION
1690 REM
1700 PRINT:PRINT"HERE IS A SUMMARY OF YOUR ORDER. IF THERE IS AN ERROR, CORRECT IT NOW."
1710 PRINT
1720 PRINT"LINE/NO","QTY","PRT/NO":TAB(50);"DESC":TAB(68);"UNIT PRICE"
1730 FOR X=1 TO 80:PRINT#1,"-":NEXT X
1735 FOR X=1 TO CR:IF A(X,2)=0 THEN 1745
1740 PRINT#1,A(X,1),A(X,1),A(X,2);TAB(70);USINGU2$;A(X,2)
1745 NEXT X
1750 PRINT:PRINT"EXTENDED TOTAL OF ORDER $":USINGU$;A4
1760 PRINT:INPUT"OK=ALL ENTRIES CORRECT, C=MAKE CORRECTIONS, A=ADD ENTRIES":X1$
1770 PRINT:IF X1$="OK" THEN GOTO1870
1780 IF X1$="C" THEN PRINT"TO DELETE A LINE, ENTER '0' IN ALL FIELDS ELSE ENTER CORRECT DATA":GOTO1800
1790 IF X1$="A" THEN CR=CR+1
1800 PRINT:INPUT"LINE NUMBER":X
1810 IF X1$="A" AND X<CR THEN PRINT"INCORRECT LINE # FOR ADDITION.NEXT LINE IS #":CR:GOTO1800
1820 IF X>CR THEN PRINT"YOU DON'T HAVE THAT MANY LINES!":GOTO1800
1830 INPUT"QUANTITY":A(X,1);INPUT"PART #":A(X,1);INPUT"DESCRIPTION":A(X,2);INPUT"UNIT COST":A(X,2)
1840 A(X,3)=A(X,1)*A(X,2)
1850 A4=0:FOR X=1 TO CR:A4=A4+A(X,3):NEXT X
1860 GOTO1700
1870 RETURN
2000 PRINT:INPUT"ENTER YOUR COMMENTS--LIMIT 255 CHARACTERS.":R$
2010 RETURN

```



DISK DRIVE WOES?  
PRINTER INTERACTION?  
MEMORY LOSS?  
ERRATIC OPERATION?

# Don't Blame The Software!

Power Line Spikes, Surges & Hash could be the culprit! Floppies, printers, memory & processor often interact! Our patented ISOLATORS eliminate equipment interaction AND curb damaging Power Line Spikes, Surges and Hash.

- ISOLATOR (ISO-1) 3 filter isolated 3-prong sockets; integral Surge/Spike Suppression; 1875 W Maximum load, 1 KW load any socket \$62.95
- ISOLATOR (ISO-2) 2 filter isolated 3-prong socket banks; (6 sockets total); integral Spike/Surge Suppression; 1875 W Max load, 1 KW either bank \$62.95
- SUPER ISOLATOR (ISO-3), similar to ISO-1 except double filtering & Suppression \$94.95
- ISOLATOR (ISO-4), similar to ISO-1 except unit has 6 individually filtered sockets \$106.95
- SUPER ISOLATOR (ISO-11) similar to ISO-2 except double filtering & Suppression \$94.95
- CIRCUIT BREAKER, any model (add-CB) Add \$ 8.00
- CKT BRKR/SWITCH/PILOT (CBS) Add \$16.00

AT YOUR  
DEALERS

Master-Card, Visa, American Express  
Order Toll Free 1-800-225-4876  
(except AK, HI, PR & Canada)

**Electronic Specialists, Inc.** ✓93  
171 South Main Street, Natick, Mass. 01760  
Technical & Non-800: 1-617-655-1532



## OSI COMPATIBLE HARDWARE

- IO-CA10X SERIAL PORT** \$125  
ACIA based RS-232 serial printer port. DIP SWITCH selectable baud rates of 300-9600. Handshaking (CTS) input line is provided to signal the computer when the printer buffer is full. Compatible with OS-65U V1.2 and OS-65D.
- IO-CA9 PARALLEL PORT** \$175  
Centronics Standard Parallel printer interface for OSI computers. The card comes complete with 10 ft. of flat ribbon cable. Compatible with OS-65D and OS-65U software.
- IO-CA9D DIABLO PARALLEL PORT** \$175  
DIABLO 12 BIT WORD Parallel port for use with word processor type printers. Complete with 10 ft. cable. Compatible with OS-65U software.
- IO-LEVEL 3 MULTI-USER EXPANSION** \$450  
Provides 3 printer interfaces currently supported by OSI-Serial, Centronics Parallel, Diablo Parallel. 4K of memory at D000 for Multi-user executive. 4 Port serial cluster. The LEVEL 3 card allows expansion of an OSI C3 machine up to 4 users with appropriate additional memory partitions.
- 24MEM-CM9...\$380** 16MEM-CM9...\$300 8 MEM-CM9...\$210  
24K memory card is available at 3 different populated levels. All cards are fully socketed for 24K of memory. The card uses 2114-300ns chips. DIP SWITCH addressing is provided in the form of one 16K block and one 8K block. Also supports DIP SWITCH memory partition addressing for use in multi-user systems.
- FL470 FLOPPY DISK CONTROLLER** \$180  
OSI-Type floppy disk controller and real time clock. Will Support 5 1/4" or 8". Single or double-sided drives. Requires drives with separated data and clock outputs.
- BIO-1600 BARE IO CARD** \$50  
Super I/O Card. Supports 8K of 2114 memory in two DIP SWITCH addressable 4K blocks. 2 16 Bit Parallel Ports may be used as printer interfaces. 5 RS-232 Serial Ports with CTS & RTS handshaking. With manual and Molex connectors.
- BMEM-CM9 BARE MEMORY CARD** \$50  
Bare 24K memory card, also supports OSI-type real time clock and floppy disk controller. With manual and Molex connectors.
- #96 PROTOTYPE CARD** \$35  
Prototype board holds 96 14 or 16 pin IC's. Will also accommodate 18, 24, or 40 pin IC's. Row and column zone markings, easy layout. 1/16" epoxy glass P.C. board.
- C1P-EXP EXPANSION INTERFACE** \$65  
Expansion for C1P 600 or 610 boards to the OSI 48 Pin Buss. Uses expansion socket and interface circuitry to expand to 48 Pin Backplane. Requires one slot in backplane.
- BP-580 BACKPLANE** \$47  
Assembled 8-slot backplane with male Molex connectors and termination resistors.
- DSK-SW DISK SWITCH** \$29  
A circuit when added to OSI Minifloppy systems extends the life of drives and media. Accomplish this by shutting off Minifloppy Spindle motor when system is not accessing the drive. Complete KIT and manual.
- PW-5-6 POWER SUPPLY** \$29  
Power One brand supply 5V - 6 amps with overvoltage protection. Reg. \$49.95.

**D&N MICRO PRODUCTS, INC.** ✓293

3684 N. Wells Street Ft. Wayne, Indiana 46808  
219/485-6414

TERMS: Check or money order Add \$2 Shipping, Outside U.S. add 10%.

# SAY MERRY CHRISTMAS with kilobaud MICROCOMPUTING

Kilobaud MICROCOMPUTING offers the reader:

more pages of articles monthly than any other microcomputing journal  
reviews, programs, applications, projects  
and ways to save hundreds of dollars

Kilobaud MICROCOMPUTING offers you a great way to say MERRY CHRISTMAS.

What better way to say  
MERRY CHRISTMAS to:

your friend  
your boss  
your business associate  
even your father-in-law

than with a subscription to  
Kilobaud MICROCOMPUTING.

Yes, I'll give a year of Kilobaud Microcomputing for Christmas (1 year/\$25.00)

My Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Please enter a one year gift subscription to:

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Canadian \$27.1 year only. US funds. Foreign \$35/1 year only. US funds.  
Kilobaud Microcomputing • Box 997 • Farmingdale NY 11737  
All Christmas gift subscriptions will begin with the January 1982 issue.

61NB7



# Around the World With Videotext

By Henry and Elizabeth Urrows

**M**uch talent is at work developing computer-based communications systems that use television, the telephone or cable. Most of the inventions originated in England, France, Canada and Japan. We, in the U.S., cautiously adapt what is emerging elsewhere for our massive yet hard-to-predict markets.

We are now in an era of videotext concept trials and market tests, gingerly introducing what others began a decade ago. Our private enterprise economy inhibits risky, costly experi-

ment. Countries which have government-financed enterprises and national post and telegraph authorities (PTTs) are bolder than our corporations, whose officers are afraid of letting their bottom lines sag.

Videotext studies are a fascinating small industry in themselves. The only *happenings* in their variegated terrain of pilots, models and trials are the one-way Ceefax and Oracle teletext systems in England, the British Telecom two-way Prestel viewdata system, Prestel International in eight

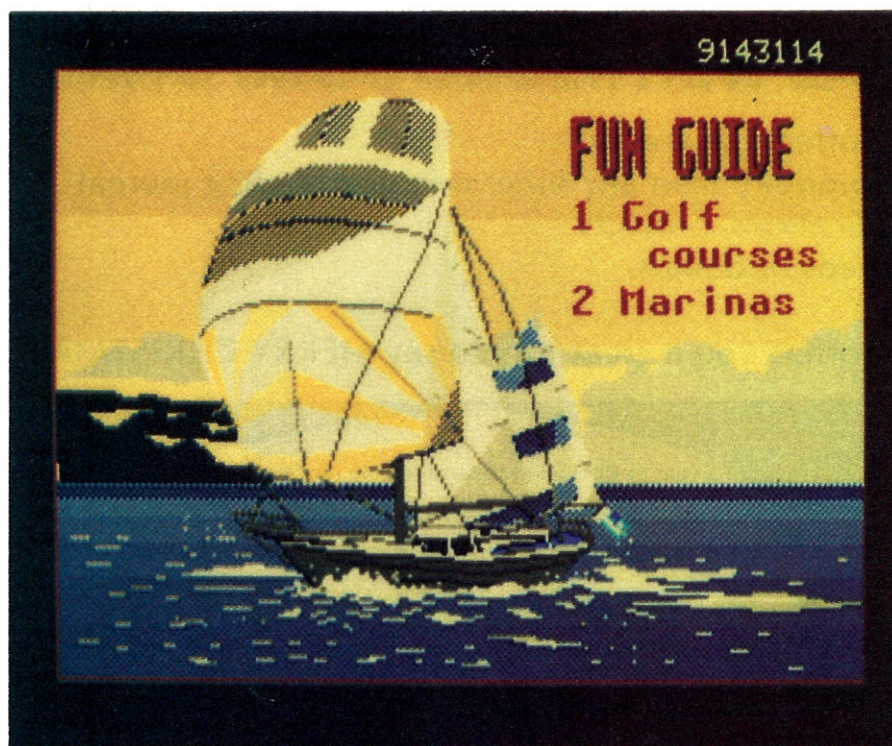
countries and the Finnish commercial Telset in Helsinki. You can add the Dutch TVS in Amsterdam that began in 1980, and for perspective include the Dow Jones News/Retrieval Service, CompuServe and The Source. After these, all the rest are tests.

## Swiss Trial

One of the smallest two-way viewdata trials has been going on in Switzerland since November 1979. It began as a 16-port system, using Prestel software. An interesting feature of the system is its ability to use either German or French. After accessing the system, the user chooses which language will be used for that session. (All error messages are bilingual.)

Because of a shortage of terminals, the Swiss PTT began the trial with very few users. By March 1980 there were 70 business subscribers and 20 PTT departments using 32 ports. In July memory space increased from 4.8M bytes (4000 pages of information) to 70M bytes (60,000 pages). By March 1981 there were 86 subscribing organizations and 100 members of the Swiss Viewdata Information Providers Association (SVIPA) looking toward a test service in 1983 with 2000 subscribers.

The Swiss trial is pertinent to the U.S. because it addressed the question of whether the PTT should limit its role to *transport* of information



Telidon travel guide introduces two sets of pages. (See taxi photo on page 88.) [Courtesy of Infomart.]

Address correspondence to Henry and Elizabeth Urrows, Box 332, Ridgefield, CT 06877.



(i.e., service as a common carrier) or also offer storage capacity to information providers. (As long as the Bell System's functions are being defined by the U.S. Congress, the Federal Communications Commission and the courts, it is hard to tell whether AT&T will be only a manufacturer of Western Electric videotext terminals, a network, a publisher of electronic yellow pages or some combination of these.) The SVIPA strongly opposes the PTT offering even limited storage space to information providers, especially to small ones who cannot afford their own external databases and do not want to depend on private umbrella information providers. SVIPA is afraid the PTT would sell storage at lower prices than private database owners.

Standard Telephone and Radio AG (STR) technical director Peter A. Gfeller and data systems manager Pierre E. Schmid have written that "one point of particular sensitivity and interest" is how Canada's advanced Telidon alpheometric graphics "could be introduced in the alphamosaic European world." STR proposed that every terminal have minimal alphamosaic capability. The videotext center is to be transparent for all other formats. They foresee multiple-mode terminals that will be able to switch between alphamosaic and alpheometric modes. Such a terminal should resemble those implicit in the AT&T Presentation Level Protocol standard (see "Setting the Standards for the Industry," *Microcomputing*, Oct. 1981, page 77).

Switzerland's July 1980 specifications for the trial envisioned:

- three transparent videotext centers interconnected via the Swiss data network TELEPAC
- information retrieval through the Public Switched Telephone Network (PSTN) and the videotext center
- information input directly to databases either through PSTN or TELEPAC
- data collection provisions
- a message service
- closed user groups
- three languages
- separate subscriber modems
- and a gateway function to external databases.

### Gateway and Bildschirmtext

The Deutsche Bundespost has said it will introduce its Bildschirmtext viewdata service across West Ger-

many in 1983. Duesseldorf and Berlin field trials have been in progress with 6000 terminals since June 1980. The genius of Bildschirmtext (Btx) is that, using enhanced Prestel hardware and software, videotext centers serve as a network giving users access to third-party host-computer databases. Banks, publishers, stores, travel firms, etc., can use their computers via Btx to facilitate electronic funds transfer, for remote ordering of goods and services and for real-time

pany requires or indeed that the marketplace will buy."

The Gateway facility eliminates the practical problems of large remote data-storage costs, slowed response times, and unfriendly preliminaries required to establish network user identity, password and network address of the host computer. By simply selecting the Gateway page of an external computer, the terminal user connects with it.

West German organizations seek-

---

The benefit of viewdata has not been to save money or time for Whitbread, but to overcome the resistance which many people in industry seem to have to the use of computers.

---

updating of databases.

Heinzfried Mantel, data communications systems development chief of Standard Elektrik Lorenz AG (SEL), has described a Seltex center designed to serve approximately 80,000 subscribers. It stores 100,000 frames of information in its basic configuration and can be enlarged to store up to 2 million pages. Gateway service subscribers and information providers communicate with the center by public telephone and the network of videotext centers.

In sales parlance, Gateway is hot. British Telecom has licensed it from the Bundespost and promises to offer Gateway service on Prestel while its Canadian competitors say they can in time deliver Gateway with Telidon. At the Videotext '81 conference at Toronto last May, Alan R. Haimes, information systems divisional manager of Systems Designers Ltd. in Surrey, explained how Gateway enables private viewdata systems to seize advantage of both public and private services.

Private viewdata systems that do not furnish their own networks and that have numerous remote locations incur large telephone toll charges. With Gateway, however, a private viewdata system can use a public service for local-call access to a local viewdata center.

"This arrangement," according to Haimes, "leaves the third party (i.e., private) database operator free to provide any of the services his com-

ing to make Gateway connections over the last two years have been forced, Haimes said, to develop their own software. Others now have the benefit of their pioneering. This can make Gateway service cheaper, faster and more reliable.

### Prestel, Ceefax, Oracle

Richard Hooper, director of Prestel for British Telecom, says that there will be full Gateway service on Prestel in early 1982. And that 120 organizations are queued up to use it.

In Britain 14 private viewdata systems are in operation. TOPIC (Teletext Output of Price Information by Computer), operated by the London Stock Exchange since June 1980, can connect 1000 terminals to each Modcomp Classic 7870 computer without exceeding the maximum tolerated response time of one second, and can handle a peak of 200 page-requests per second on each machine. Orders will bring the total number of terminals to 1300 by April 1982. Designed for flexibility, TOPIC can serve closed user groups, connect to remote country locations by public networks, use Gateway to view client portfolio data and to access Ceefax, Oracle and Prestel.

One private system unlikely ever to want Gateway is Whitbread breweries' DAISY (Daily Information System), which consolidates data on customers' orders coming from five regional computers into easy-to-read-at-a-glance colored graphic produc-



tion charts. The benefit of viewdata has not been to save money or time for Whitbread, but to overcome the resistance which many people in industry seem to have to the use of computers, Sam Fedida and Rex Malik have written.

Among Prestel enhancements are high-resolution graphics, single color dynamic redefinable character sets (DRCS) succeeded by multicolor, multilanguage text, smoothline graphics, ranges of pastel colors and color borders, data encryption for users' security and the new PANDA (Prestel Advanced Network and

associated equipment. There is also Picture Prestel, demonstrated at Viewdata '80 by DPCM (Differential Pulse Code Modulation) but due to be introduced in London as the first phase of an integrated services digital network.

Britain's Ceefax and Oracle teletext systems have earned sufficient user acceptance to assure their continuation. Ceefax is paid for by the license fee every TV set owner or renter must pay according to British law. Ceefax has taken less than \$1 million in capital investment and no more than \$500,000 in annual operating

Prestel. Equipment and microchip manufacturers had put in an estimated \$24 million, and over 200 information providers at least \$7.2 million.

British Telecom, split off from the Post Office by an act of Parliament, is not yet making money from Prestel. The worst depression in England since the 1930s is a central factor, and may well explain why seven out of eight subscribers are business users able to charge their decoders and fees as company expenses. The assumption that entrepreneurs in the U.S. are making is that videotext is a mass residential market along with broadcast and cable TV.

Prestel can be useful when it lets users avoid lines at banks and travel agencies when ordering checks, booking airline space, getting theater and train seats and finding updated information quickly and conveniently. Too many persons in service occupations there (and in the U.S., too) hate their jobs. Some bureaucrats in government, business, and institutions waste time telling you at length why they can't help you. For consumers who would just as soon have competent comparison shopping done for them, who seek apartments or job openings that are too often taken before newspapers advertising them hit the street, for executive searchers hunting exactly the right candidate with minimum rigmarole—viewdata can work.

#### Antiope

CBS petitioned the FCC on July 29, 1980 to adopt a teletext standard

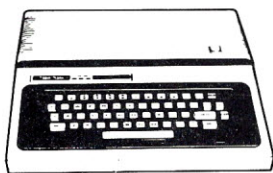
Prestel can be useful when it lets users avoid lines at banks and travel agencies when ordering checks, booking airline space, getting theater and train seats and finding updated information quickly and conveniently.

Database Architecture) network. This means Gateway with messages and access to third party databases, tailored insurance quotations and mortgage calculations, real-time service on airline and hotel reservations, high volume data capture for transactions such as mail orders, very large specialized scientific and bibliographic databases, printers and

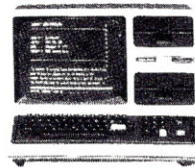
costs. The IBA is a profitable commercial TV enterprise that makes enough profit to afford Oracle as a public service. Because teletext can also be an advertising medium, what public service CBS, NBC and Westinghouse contribute will be incidental to their profit-making functions.

The British Post Office has already invested more than \$48 million in

## AUTHORIZED TRS 80® DEALER #R491

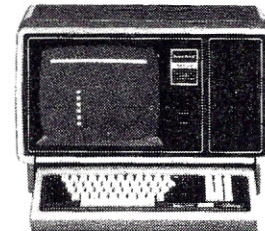


TRS-80® Color Computer With Extended Color BASIC



26 - 1062  
Model III 16K RAM  
Model III, BASIC

**\$825.00**



26 - 4002  
Model II, 64K

WE ACCEPT CHECK, MONEY ORDER, OR PHONE ORDERS WITH VISA OR MASTERCARD. SHIPPING COSTS WILL BE ADDED TO CHARGE ORDERS. DISK DRIVES, PRINTERS, PERIPHERALS, AND SOFTWARE — YOU NAME IT, WE'VE GOT IT. WRITE OR CALL FOR OUR COMPLETE PRICE LIST.

C & S ELECTRONICS, LTD. 32 EAST MAIN ST. MILAN, MICH. 48160

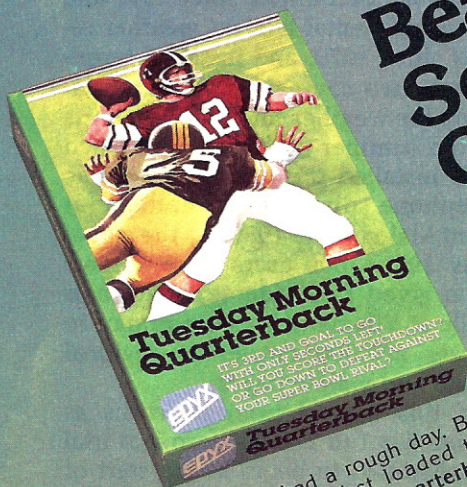
✓79

(313) 439-1508 (313) 439-1400

C & S ELECTRONICS MART IS AN AUTHORIZED TRS 80® SALES CENTER STORE #R491



# Beat The Socks Off Your Computer



...You've had a rough day. But now it's fun time; you've just loaded the brand new **Tuesday Morning Quarterback™** program into your computer. You're the quarterback. And the coach, general manager, star. You're going to beat the socks off your computer. Or off a human opponent. You hope.

You pick the NFL team that plays closest to your management style. Now you assign a team to your computer ... or let a friend pick out an opposing team. If you want a better chance to win, pick a strong team; give your computer a weak team. (Don't try giving a weak team to a friend; just make sure you get first choice. After all, it's your game.)

You still have to play smart, though. And have a bit of luck on your side, too. Otherwise, your computer might beat the socks off you. (Later, as you get better, you can show your smarts by having your weaker team beat your computer's stronger team.

**Now it's game time.** List your line-up. If it's your ball, call the plays: running plays like **quarterback sneak\***, **draw\***, **sweep\*** ... 6 choices. Or pass plays: **short curl\***, **screen\***, **bomb\*** ... 8 choices. And option\* and trick plays, too.

The opponent has the ball. Call a normal 4-3 or 3-4 defense\*. Or pull a line-backer out for a nickel\* pass defense. Or call for the blitz\*. But if figure the other team is going to pass and you'd like to sack\* their quarterback. But if their team elects to run, you're probably in trouble. 6 defensive strategies, including the Butkus\*.

**Tuesday Morning Quarterback.** 16 offensive plays; 6 defensive strategies. And rosters to pick from, draft choices and trades to make. With a probability structure that comes so close to the believably close to the real thing. It's never the same game

twice. Superb graphics, real-time. Even color (with the Apple) and sound. You won't get bored playing the game. Not in your or your computer's lifetime.

**Another bug-free, easy-loading lifetime computer game from EPYX.** With the unique **EPYX lifetime warranty:** If anything happens to your cassette or disk at any time and for any reason, send it back with just \$5.00 for shipping and handling and we'll send you a brand new one.

(Of course, there is also our 30-day unconditional guarantee: if your EPYX game has any defect whatsoever within 30 days of purchase, return it to us or to your dealer and we will replace it free.)

Visit your dealer now and pick up **Tuesday Morning Quarterback** in its good-looking, protective box with the best instruction book you ever read. Now available on disk for the Apple II (48K RAM with Applesoft) and Radio Shack's TRS 80 (48K RAM). Only \$29.95.

If your dealer is out of stock and you can't wait, order directly from Automated Simulations, \$29.95 plus \$2.00 for shipping & handling (and sales tax if you're in California).

Enclose your check. Or if you order by Visa or MasterCard, use our toll-free phones: In the United States: operator 861 (800) 824-7888; In California: operator 861 (800) 852-7777; In Hawaii and Alaska: operator 861 (800) 824-7919.

**Order today. You and your computer deserve the fun.**

\*These terms are all explained fully—and delightfully—in the glossary of the big instruction book... a book so good even a novice will soon understand pro football. And enjoy.

**AUTOMATED SIMULATIONS, INC.**

Dept. T1, P.O. Box 4247  
1988 Leghorn Street  
Mountain View, CA 94040





based on the French Antiope (Acquisition Numerique et Televisualisation d'Images Organisees en Pages d'Ecriture) system. Antiope has a variable or asynchronous format, unlike the British Ceefax, Oracle and Prestel, which have a synchronous or fixed format. In the British system the position of data on the TV scanning line directly relates to the position of the display on the TV screen. With Antiope, there is no relation-

ship between the data on the TV scanning line and its location on the screen.

CBS's supporting engineering statement said each of the two systems has advantages and disadvantages, based on fixed format tests made at KMOX-TV St. Louis and variable format transmissions over KNXT-TV Los Angeles. CBS technical people chose the latter in the belief the variable format can more easily adapt to

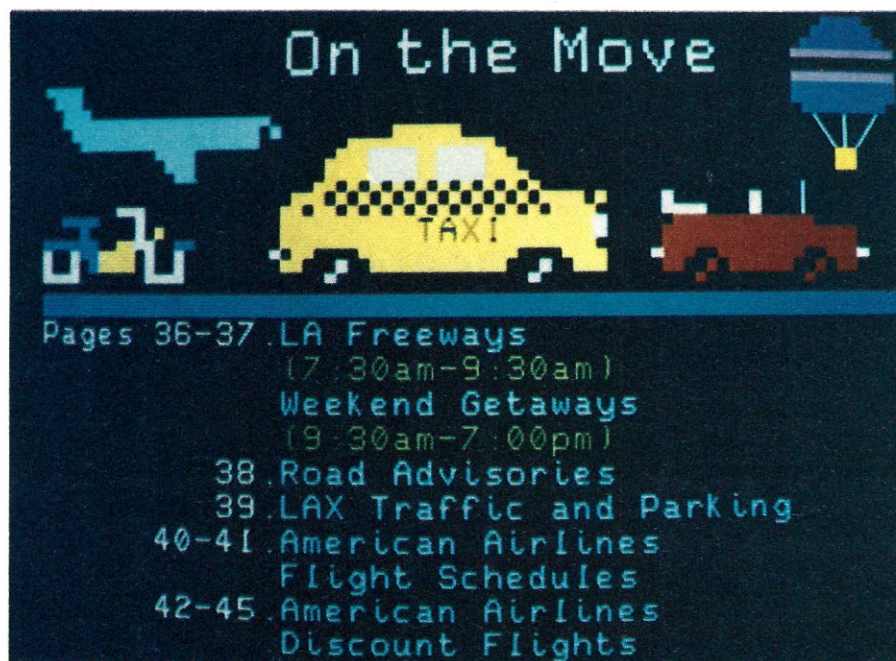
changing technology.

France's one broadcasting company, Telediffusion de France (TDF), has broadcast a stock teletext service in partnership with the French Stock Exchange Committee since 1977 and an experimental teletext weather report since 1979, and installed terminals at two companies' gasoline stations for weather and traffic reports in the summer of 1980. The French PTT installed the first 50 electronic telephone directory terminals at Saint Malo in July 1980. By the end of May 1981, 1500 users were to have been given free videotext terminals in Ile et Vilaine in western France to access 270,000 entries of regional white and yellow pages.

If this second pretrial works as planned, a full 270,000-terminal trial is scheduled to begin at the start of 1982, looking toward a national electronic telephone directory serving 30 million customers by 1992. The French PTT believes it will cost less to give away terminals on that scale than to continue printing telephone books, which now cost about \$230 million a year.

Looking toward national acceptance of Teletel, the two-way view-data system based on Antiope, nearly 170 business and government organizations have contracted to furnish database material for a trial in Velizy, southwest of Paris, where the first 20 terminals were placed in April and 2500 residences—2100 equipped with Teletel adapters to color TV sets and 400 with black-and-white terminals—are to be connected by September 1981. Starting in June, 300 users were to have been supplied with smart cards—plastic cards embedded with microcomputers which can be used for up to 100 home and point-of-sale financial transactions—and smart card readers interfaced with Teletel terminals.

According to Intelmatique, Teletel has Gateway, permitting users instant access to third-party databases throughout France. And Lee R. Greenhouse of the Link Resources market research firm wrote in the February 1981 issue of *Data Communications* that with the Teletel network France's approach differs from other countries "in that its public network handles all switching and network management, but not database control. . . . Teletel will have no central computer, as have both the British and the West German implementations. Instead, the network it-



"On the move" from the Telidon travel guide.



Oriental language characters have presented unique problems, but these, from Antiope Videotex Systems, can be downloaded using DRCS (dynamically redefinable character sets).



# NEED A PRINTER?

UP TO 25% DISCOUNTS! — SAME DAY SHIPMENT!



## CENTRONICS 739 (RADIO SHACK LINE PRINTER IV)

With Graphics and  
Word Processing Print Quality

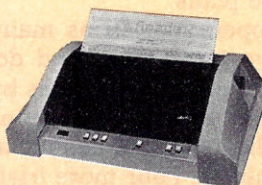


• 18 x 9 dot matrix; suitable for word processing • Underlining • proportional spacing • right margin justification • serif typeface • 80/100 CPS • 9½" Pin Feed/Friction feed • Reverse Platen • 80/132 columns • Top of form

CENTRONICS 739-1 (Parallel) ..... (List \$995) \$765  
CENTRONICS 739-3 (Serial) ..... (List \$1045) 815  
GRAPPLER™ Apple graphics interface ..... \$165

## ANADEx

Dot Graphics, Wide Carriage

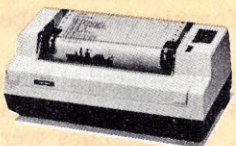


• 11 x 9 dot matrix; lower case descenders • Dot resolution graphics • Bidirectional, logic seeking • Up to 200 CPS • RS 232 Serial & Parallel • Forms control • X-ON/X-OFF • Up to 6 part copy.

ANADEx 9501 ..... (List \$1650) \$Call  
GRAPPLER™ Apple graphics Interface ..... \$165

## VISTA — C. ITOH STARWRITER

Daisy Wheel Letter Quality

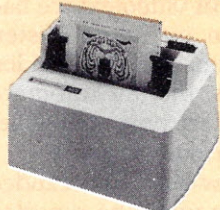


• 25 CPS (Optional 45 CPS) • Typewriter quality • Centronics parallel • RS 232 Serial (Optional) • Proportional spacing • Bidirectional • Programmable VFU • Self test • Diablo compatible • Friction feed (Optional tractors) • 136 printable columns • Manufactured by C. ITOH.

VISTA V300 (C. ITOH) STARWRITER ..... (List \$1895) \$1575

## IDS PAPER TIGERS

Dot Resolution Graphics, quality print, speed

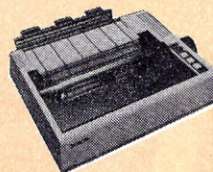


9 wire printhead (460) with lower case descenders • Over 150 CPS • bi-directional, logic seeking • 8 character sizes; 80-132 columns • Adjustable tractors • High-resolution dot graphics • Proportional spacing & text justification

IDS 460G 9 wire printhead, graphics ..... (List \$1094) \$Call  
IDS 560G wide carriage, graphics ..... (List \$1394) \$Call  
GRAPPLER™ Apple graphics interface ..... \$165

## EPSON MX80/MX70/MX100

Low-Priced  
Professional Print Quality



• 9 x 9 dot matrix • Lower case descenders • 80 CPS • Bidirectional, Logic seeking • 40, 66, 80, 132 columns per line • 64 special graphic characters: TRS-80 Compatible • Forms handling • Multi-pass printing • Adjustable tractors

We also carry a full line  
of Epson Accessories.

EPSON MX80 (& MX80FT) ..... (List \$645) \$Call  
EPSON MX70 Dot graphics, 5 x 7 matrix ..... (List \$450) \$Call  
EPSON MX100 wide carriage, graphics ..... (List \$945) \$Call  
GRAPPLER™ Apple Graphics Interface ..... \$165  
GRAFRAX 80 - MX80 Dot Graphics ..... \$ 95

## MX80/70 FRICTION FEED KIT

User installable kit for single sheets.

Easy 30 minute installation ..... \$ 75

## ANACOM

Low Cost, High Speed, Wide Carriage

• 9 x 9 dot matrix • Lower case descenders • Wide carriage • Adjustable tractors to 16" • 150 CPS, Bidirectional, Logic Seeking

ANACOM 150 ..... (List \$1350) \$995

## NEC SPINWRITER

High Speed Letter Quality

• 55 CPS • Typewriter quality • Bidirectional • Plotting • proportional spacing.

5510 RO, Serial ..... (List \$3055) \$2575  
5530 RO, Parallel ..... (List \$3055) \$2575



QUANTITY PRICING AVAILABLE

## TELEVIDEO CRT'S AT DISCOUNT PRICES!

TVI 910  
TVI 912C  
TVI 920C  
TVI 950

Please Call Toll Free  
Prices are too low to  
advertise

### CRT'S

ADDS VIEWPOINT ..... (List \$698) \$600

### PRINTERS

MALIBU 165 wide carriage, graphics, letter quality .. (List \$1975) \$1325  
QUME 5/45 typewriter quality ..... (List \$2905) \$2559  
DIABLO 630 ..... \$Call

### INTERFACE EQUIPMENT

EPSON ACCESSORIES ..... \$ Call  
ORANGE INTERFACE for Apple II  
parallel interface board & cable ..... \$ 110  
MICROTRONICS Atari parallel interface ..... \$ 69  
TRS-80 CABLES to keyboard or Exp. interface ..... \$ Call  
NOVATION D-CAT direct connect modem ..... \$ 180

CALL FOR INFORMATION & CATALOG

(800) 854-8275

CA, AK, HI (714) 630-3322

### RETAIL PRINTER STORES:

Store #1 3150 E. La Palma, #I, Anaheim, CA (714) 630-3622  
Store #2 13604 Ventura Bl., Sherman Oaks, CA (213) 501-3486

Store Hours: M-F 10-6 Sat. 10-4



Orange Micro  
inc.

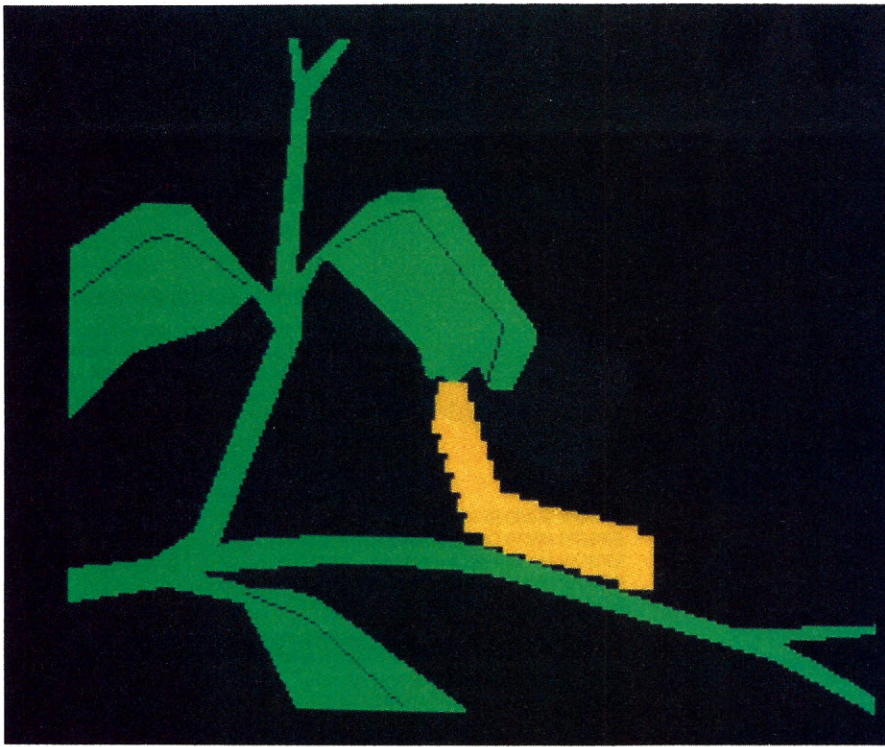
✓310



3150 E. LaPalma, Suite G, Anaheim, CA 92806

Phone order WELCOME; same day shipment. Free use of VISA & MASTER-CARD. COD's accepted. Manufacturer's warranty included on all equipment. Prices subject to revision.





*Animated Telidon sequence that shows a caterpillar eating a leaf and turning into the butterfly. (Andrej Teene-Sens, informatics technical adviser to the Canadian federal Department of Communications, believes these kinds of animation are possible only in alphasometric teletext and viewdata systems.)*

are also studying a three-channel videodata multiplexer that will be fully microcomputer-programmed to assign each field the number of lines needed for transmission of the data present in the buffers assigned to each digital channel. They call this dynamic allocation and say that "to make the best use of the possibilities offered by the asynchronous system will certainly take a while to finalize." DIODE combines a high data rate and wide coverage. It points a way to solve the problem of congested interactive networks.

## Telidon

Canada's videotext salesmanship has such a high energy level and is so vigorously resourceful that it isn't easy to separate achievements from dazzling future plans.

Four pilot operations in as many provinces have transmitted and decoded many thousands of frames by satellite, on-air broadcasts, phone wires and dedicated cable pairs to at least 125 terminals. Four more trials with government money, and three using corporate and utility capital, have begun or are scheduled. Canada began a four-year encouragement program committing \$10 million in 1979. This was increased by \$27.5 million in 1981, when Bell Canada said it will invest \$8.5 million in trials being held in Toronto and Quebec City.

Telidon was demonstrated at Information Utilities '81, held in New York this April. The graphics were beautiful, even though the salesmen at the exhibit tended to use selective truths that didn't withstand careful scrutiny.

We were captivated, though, by the best organized and most incisive oral presentation of videotext we had ever heard, given by Larry Pfister, sales vice-president for the Telidon Videotex Systems, Inc. for Infomart, the Canadian electronic publisher and vendor of turnkey systems.

Pfister was low-key, yet exuded strong confidence when he reported that Time, Inc. will use Telidon for its late 1981 teletext test on one of the cable systems owned by its American Television & Communications Corporation (ATC) subsidiary, and that the Times Mirror has said it will buy a 200-terminal field trial setup operating simultaneously over telephone and two-way cable networks in Los Angeles and Orange counties in California, also in late 1981.

self will do all switching, connecting users with the appropriate hosts, which are maintained by the information providers and contain the interface software."

France plans to invest \$27 billion during the next five years to become the "Charlemagne of the wired nations" and a major source of communications technology, having set an initial objective of exporting 30 percent of its telecommunications equipment by 1982. France has thus far been bolder than Britain in selling. To help bring the cost of terminals down, the French PTT itself ordered 300,000 from four manufacturers in May 1981, and Tymshare of Cupertino, California has ordered 100,000 personal computer terminals from the French manufacturer Matra. TDF has loaned Antiope teletext equipment—page generation, captioning gear and the patented Didon transmission system—that cost more than \$1 million for the Los Angeles trial by CBS of its Extravision teletext over the CBS TV station KNXT and by PBS station KCET of its teletext magazine NOW. On-air service began in April 1981 to less than a score of terminals in public places, looking toward 100 more decoders being in homes by

end of summer. French promoters are unafraid to prime their pumping of U.S. markets with competitive selling zest.

Antiope Videotex Systems, Inc. sent Claude Sechet to speak at IEEE in Chicago in June 1980 on Antiope teletext captioning. The Didon system is transparent in accepting any kind of digital signal without altering it in any way. Sechet said the Antiope variable asynchronous format permits placing the caption anywhere on the screen, using the same decoder for captions and teletext and DRCS for symbols. Prototypes were testing the validity of these services when he gave his paper.

General Manager Marcel Berger of Sofratev and chief engineer Y. Noirel of TDF's CCETT data broadcast procedures lab described DIODE (Diffusion d'Information Obtenu par Demande), the data retrieval system that uses entire TV channels to transmit nothing but data, at Toronto in May 1981. They said six magazines with about 600 pages using about 60 lines per field were being broadcast over a specialized network employing only one-fifth of one channel's capacity. Sofratev and CCETT plan to put into operation a 20-channel videodata multiplexer this year. They



Canada is jumping with trials and announcements of more to come. Since January 1980 the Ontario Educational Communications Authority has sent teletext pages to 55 terminals, some of them in a remote northern town reached by the ANIK-B satellite.

Since May 1980 the Manitoba Telephone System has connected 100 homes in South Headingley with coaxial cable (providing residents with digital telephone, answering and message service, telemonitoring for fire alarms, etc.) of which 30 are trying out Telidon terminals.

In late April 1981 the New Brunswick Telephone Company began rotating 45 Telidon terminals among 75 homes, businesses, and such institutions as the community college, public library and the University of New Brunswick's local campus in Saint John.

On May 20 Bell Canada kicked off its Telidon trial in Toronto and Quebec City, initially with 491 terminals, rationing half to homes, one-fourth to businesses, 15 percent to public places and 10 percent to educational users. Dubbed VISTA, it is not charging users or information providers.

In early May the Manitoba Telephone Co. installed 25 Telidon terminals in offices of grain elevator operators, crop-insurance agents, agriculture agents and places where farmers gather to do business in the southern part of the province. Two dozen information providers pay a dollar per page per month to furnish data on market prices, feed costs, grain



*The butterfly from the animated Telidon sequence.*

futures and other variables that affect agribusiness. This Project Grassroots network will expand in the fall with some of the 150 terminals planned for the Elie-St. Eustache area testing Telidon transmission over optical fiber and there's expectation of expansion to break even—providing terminals and service at less than \$60 per month before the end of 1982.

The Alberta Government Telephone utility is not forthcoming about just when its mid-1981 test

network begins. Instead of using 120 terminals as planned, it's reported to be "bicycling" 30 sets among 120 locations.

British Columbia Telephone Co.'s videotext project market research supervisor says its 125 receivers will cost about \$3000 each and should be in use this coming September and October in a trial budgeted at \$3 million.

Projecting future terminal prices is something of an arcane art. Roger Woolfe of Butler, Cox & Partners, the


**No.1**  
**UNBELIEVABLE**  
**OPPORTUNITY!**


*If You've Written a  
Topnotch Program--  
We'd Like to Publish It!*

**Programs needed for BUSINESS/  
OFFICE Applications:**  
**WORD PROCESSING**  
**PAYROLL/TAX CALCULATION**  
**GENERAL LEDGER/AR-AP**  
**ORDER ENTRY/INVENTORY**

**Start collecting your royalty  
checks soon! Write for our free  
Programmer's Kit today.**

**INSTANT SOFTWARE, INC.**  
**Submissions Dept.**  
**Peterborough, NH 03458** ✓75

 NEW! for  
the '89 from

**MAGNOLIA**   
**MICROSYSTEMS** ✓234

**DOUBLE DENSITY  
DISK CONTROLLER**

for both 5 1/4" & 8" drives  
only **\$595** complete  
including CP/M™2.2

MAGNOLIA MICROSYSTEMS, INC.  
2812 Thornhyke W., Seattle 98199  
(206) 285-7266 (800) 426-2841

CP/M is a trademark of Digital Research.

**SMALL QUANTITIES AVAILABLE**

**STOCK COMPUTER  
FORMS**

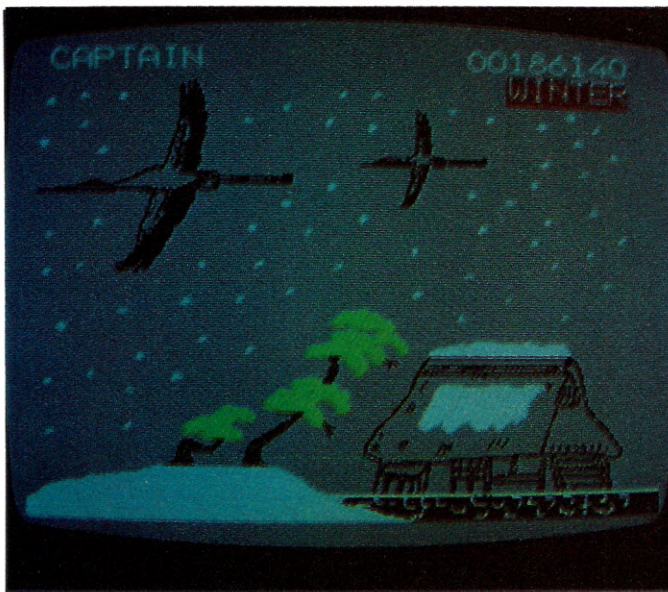
- CHECKS
- INVOICES
- STATEMENTS
- SPEED-O-GRAMS
- BILLS OF LADING
- PURCHASE ORDERS
- LEGAL SIZE PAPER

**STOCK PRINTOUT PAPER**  
**STOCK COMPUTER LABELS**  
(9 1/2" CARRIER AVAILABLE)  
**PRICE MARK LABELS - STENCILS**

**DDF DISCOUNT DATA FORMS, INC.**  
407 EISENHOWER LANE SOUTH  
LOMBARD, ILLINOIS 60148  
(312) 629-6850

Call or Write for Prices & Samples





The four photos on these two pages represent the four seasons sequence in the CAPTAIN

British consulting firm, made a study in 1980. He found that Telidon decoders with TV monitors cost \$1450 in Canadian dollars, compared with Prestel decoders at \$1120. When production quantities reach 100,000 a year, Woolfe said the Telidon units should drop to \$290.

Electrohome, one of four Canadian terminal makers, thinks it will produce over 1000 business terminals with color TV monitors in 1981 at \$3876. When sales pass 50,000 a year in 1983, Electrohome says it "will be manufacturing a complete home consumer package with monitor, standard television capability, modem, teletext receiver, decoder and possibly keyboard capability, for \$1100."

In the offing are a 150-terminal network of Canadian federal government departments connected by the DATAPAK network; 250 terminals tied into the Montreal Telecable Videotron test in early 1982; a two-city Cablecom of Saskatchewan "trial for later in 1981"; a Maritime Telephone & Telegraph Co. field trial in Nova Scotia in 1982; and the Canadian Broadcasting Corp.'s nationwide Telidon trial service forecast for the summer of 1982, at a projected cost of \$6 million.

At the heart of Telidon are picture description instructions (PDIs) that encode and store basic geometric building blocks—point, line, rectangle, arc and polygon (polygons can have a maximum of 200 sides in present software)—with a range of options as to their location on the TV screen, size, color, luminance and

other attributes. As the Department of Communications' assistant deputy minister for research, Douglas Parkhill, phrased it at the Inside Videotex seminar in March 1980: "All we do is to store in the database coordinates of the end points of the line and the computer instruction that says, 'Draw the shortest line between these two points' . . . The storage capacity (versus the older method) is enormously reduced. It would take several hundred characters to store the line as mosaics. . . In our system, it takes only five or six characters. So the secret of Telidon is . . . that any known picture can be represented by a finite number, and in fact a very small number of what we call 'picture primitives' or 'picture description instructions.' "

There are two assumptions behind anticipations that Telidon will be economically feasible. First is the expectation that the component cost will go steadily down. Second is that the costs of the users' decoders will be covered by capital from advertising.

Telidon must enhance its decoders to suit more advanced computer graphics in the AT&T videotex standard. After it does so, there may be a fresh irony when these, too, prove obsolete in the light of Japanese improved alphaphotographic videotext coding.

## CAPTAIN

We wish we could see more of the CAPTAIN (Character and Pattern Telephone Access Information Network) system as it unfolds during

premarket and market trials into full commercial service in 1983.

Although DRCS can reproduce all manner of symbols in enhanced editing and decoding terminals in the West, Japan started with 4000 different text characters—alphanumeric and special symbols.

There are four kinds of input terminals:

- tablet
- keyboard
- those capable of directly reading hand drawn figures and photos
- those using a TV camera.

The displays give the viewer the impression that his or her wishes are respected with deference. Continuous delivery of a specified number of pages without requiring successive pushing of buttons will produce an entire sequence on a particular topic. These can be disclosed line-by-line from top to bottom, character-by-character from left to right, or by the familiar upward scrolling. The user can choose high or low scrolling speeds.

When the viewer orders merchandise, after reviewing the merchandise code number, size, color and quantity, he then signals whether these were correctly recorded, or if all were incorrect or some were incorrect. Cancellations are accepted within seven days of the order date.

Possibly the most agreeable quality of CAPTAIN is a kind of grace behind the composed pages, in the respectful imparting of desired facts and figures, the stories and games. The graphics have a stylized charm abet-





videotext format. (Photos courtesy of Nippon Telegraph & Telephone Public Corporation.)

ted by pastel hues and playful animation.

### Conclusion

Now that AT&T and Western Electric seem to be coming aboard, even though they won't bring out a decoding terminal that meets their new

standard until May 1982 at the earliest, consensus is that teletext and viewdata may yet get to be big business. Let's not hold our breath. But we can bet that small, imaginative electronic publishers—such as those making video games and software for micros—will have more and larger mar-

kets. As with the early years of autos and radio there may well be high birth and death rates for companies.

Some quotient of software programs on videotext, though, should be well worth our time. At their least they'll be convenient. At their best they may bring new kinds of enjoyment. ■

## PLAIN TALK ABOUT "COPY PROTECTION"

A lot has been said and written about copy protection and software piracy since Omega made Locksmith available to Apple II users earlier this year. We have been accused of encouraging illegal copying of copyrighted software. Software publishers have threatened to boycott magazines which carry our advertising, and the pros and cons of Locksmith and copy protection devices have been debated in Apple forums throughout the country. But, we at Omega haven't really told you, the Apple user, our side of the story.

Locksmith was originally developed as an intellectual exercise by an Apple user over a year ago. And we suspect that sufficient information about the Apple DOS and the way information is stored on a disk has been long available to the general public, so that ANYONE who was REALLY interested, and who wished to spend a LOT of time, could have written a program that does many of the things that Locksmith does. Similarly, there is really no "secret" to writing data base programs, adventure programs, or even spread sheet programs. The literature is there if you want to look for it. But it takes a lot of hard work to develop any software package that works in all cases, that is crashproof, that interfaces easily with a non-experienced computer user, and that is well documented. A LOT of hard work.

But even before Locksmith was available to us, we, as Apple users, recognized a definite problem with the software we were buying and using. Much of it worked well. But it was very aggravating to not be able to make a backup copy of certain "copy protected" programs. Most software publishers didn't supply backups of their programs, and those that had any policy required signing oppressive agreements or paying questionably high yearly fees for presumed, but not guaranteed, updates. Among those who did not offer back-up was one who 'sold'

us a new copy (when we returned our crashed disk). Although they advertised the importance of having their program running every day, they made us wait up to 6 weeks to get the replacement. Most vendors just ignored the problem. We, as consumers, were simply taken advantage of. In many cases we relied so much on a particular program, that it became very costly to have to wait weeks or more to replace a blown disk. Software publishers were just not responsive to the users problems caused by "copy protection".

When we first became aware of Locksmith, we investigated the state of the law, and discovered that no one knew whether the owner of a program could copy it for backup. And for quite a while we debated whether we should market Locksmith.

On December 12, 1980, a change was made to the Copyright Act which resolved these questions. It is now the law of the United States that the existence of a copyright notice on a computer program does NOT make it illegal for the legitimate owner of that program to copy it for archival purposes. Backups are now clearly legal. (Of course, when you sell your purchased program, you must destroy the backups you have made). Only after such use clearly became legal did we decide to sell Locksmith.

Now with the new copyright law, which for the first time gave software publishers clear rights that were enforceable in court, but which also gave "backup" rights to software purchasers, and with the demonstration that Locksmith could and would provide back-up for the user, we assumed that software publishers would drop their copy protection schemes and educate the public as to their rights and responsibilities. Even the use of hardware protection that gives copy-ability to the software would be acceptable. Unfortunately, their

response has been to pressure magazine publishers into refusing our advertising, and to invent new copy protection schemes.

Well, the word about Locksmith was impossible to stop. We couldn't advertise, but we have sold a gratifyingly large number of programs. As to new copy protection schemes, the new Locksmith (version 4.0) will adjust to them, and copy virtually anything protected that way. But please. For us, for yourselves, and for the entire industry, use Locksmith only for its intended legal purposes.

The new version is more than just the best copy program available. There are also four additional utilities included. A disk speed program, a degausser, a nibble editor and a media surface analyzer are included. And we stand behind our products. Our customer service department is available (and anxious) to help with problems.

Locksmith 4.0 is available from us, or your local dealer. Visa and Mastercard users call Toll Free 1-800-835-2246. Kansas residents call 1-800-362-2421 or send \$99.95. (Registered owners of prior versions can obtain an update for only \$20. If you haven't received a letter from us, please call.)

**Another Quality Product from Omega MicroWare, Inc.** ✓201

(formerly Omega Software Products, Inc.)  
222 So. Riverside Plaza  
Chicago, IL 60606  
Phone 312-648-1944



©1981 Omega MicroWare, Inc.  
Apple is a registered trademark of Apple Computer, Inc.



# RCA's "Connection To the Computer World"

By Frank J. Derfler

**M**icrocomputers may be versatile, but they can't be all things at once. If you enjoy using data communications systems, you may frequently find that your 32K dual-disk system is busy killing Klingons just when you want to check your electronic mailbox. You might want a quick stock market report, but it seems a shame to dump the program you are debugging just so you can get on-line.

What you need is a terminal to use just for data communications. While you are at it, how about one that is small, portable and rugged, costs less than half of what you would expect to pay for a standard video terminal, and can provide a color, graphics and sound display from any computer? How about one made by a leading U.S. manufacturer? Meet the RCA VP3303 color data terminal.

## What It Is

This device is everything a complete terminal should be, minus the display. The display can be any available television set (color or black-and-white) or monitor. The terminal is small enough to fit into a briefcase

with lots of room to spare. It is light and rugged enough to go anywhere and survive nearly any treatment. It provides an extensive keyboard and many special features such as reverse video, variable colors and variable pitch and tone sound. It provides either a current loop or RS-232C interface for a modem (not supplied). The entire unit retails for \$389.

## What's Inside

The heart of the RCA 3303 is an RCA 1802 CPU. It resides inside a tough low-profile case, along with 1K of RAM for the screen, 1K x 4 of color RAM and an extensive character set in ROM. You can do a little local programming of the 3303, changing the way some characters are displayed and the print and background colors of the display screen, but essentially the RCA 3303 is a dedicated terminal device with a color display.

The keyboard surface of the VP3303 is unique. It is a tough membrane of flexible polycarbonate which eliminates the mechanical problems associated with other keyboard systems. It is easy to clean, moisture resistant and perfect for tough environments. If you have ever spilled even a few drops of coffee into a conventional keyboard, you know the trouble it can produce. The VP3303's housing is not waterproof, but a little carelessness won't cost you a new keyboard encoder.

The 58 keys can generate a full 128-character ASCII set. It certainly is nice to see the full keyboard capability with all of those brackets, lowercase characters, control codes and other symbols that can be so handy. Few microcomputers have such complete keyboards.

The television set (or a separate audio output if you are using a monitor) provides a tone each time a key is pressed, which gives the positive feedback missing in the touch.

Even after I used the VP3303, I had reservations about how the flat-faced keyboard would be accepted, so I took it to a local manufacturing company whose accounting staff spends a large portion of every day keying in payroll, accounting and personnel data. We replaced one of their on-line terminals with the VP3303 and a portable color TV set. The VP3303 is limited in display size by the bandwidth of the TV set, so it could only display 24 lines of 40 characters, but that was sufficient for many input functions.

The office workers got the feel of the keyboard after about 60 seconds on-line. They found their speed was slowed at first, but it improved to near normal after a few minutes. They praised the fact that they could move the keyboard around and even put it on their lap to type in a relaxed position.

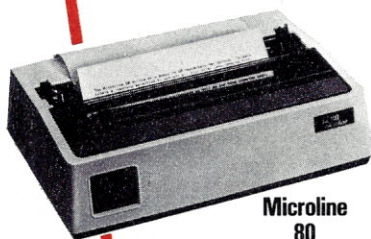
The beep tone associated with each

---

*Frank J. Derfler (PO Box 691, Herndon, VA 22070) is the author of the monthly Dial-up Directory column in Microcomputing.*



This Months Special  
**Okidata**  
**Microline 80**  
 At a New  
 Low, Low, Price!



Microline  
80

**A great buy**

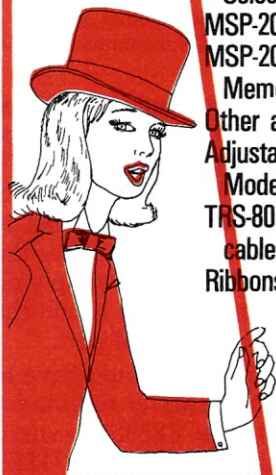
— List Price is \$449.  
 The Microline 80  
 is a quiet,  
 small printer  
 with field proven  
 reliability.

**Features:**

- Friction & pin paper feed, roll or fan fold
- Prints expanded characters and block graphics
- Print speed 80 characters per second
- Printhead rated at 200 million characters continuous cycle
- 132-column compressed print
- Available RS-232C Serial Interfaces:

**LIST**

ORS-256 (256 Character Memory) .. \$109.00  
 MSP-100 (Unbuffered, Switch  
 Select Data Rates) ..... \$120.00  
 MSP-200X (200 Character Memory) \$215.00  
 MSP-2000X (2000 Character  
 Memory) ..... \$300.00  
 Other available options:  
 Adjustable Tractor Feed -  
 Model 54100201 ..... \$ 50.00  
 TFS-80 Parallel Output,  
 cable to printer ..... \$ 35.00  
 Ribbons ..... \$ 3.00



**TRANSFORM  
 YOUR  
 COMPUTER**

into a Word Processing or  
 Data Processing System  
 by adding one of the **NEW**  
 Okidata Printers



Microline  
83A



Microline  
82A

If you require a system printer, the new Okidata  
 Microline 82A, 83A, 84 should be your choice.

These printers feature:

- 9 x 9 Dot Matrix heads rated at 200 million characters continuous duty - true lower descenders
- Full forms control - vertical tab, top of form
- Block Graphics
- Bidirectional, Short Line Seeking
- Dual Interface - Parallel & RS-232C Serial

**LIST**

Microline 82A - 80-column,  
 120 characters per second ..... \$ 649.  
 Tractor Optional ..... \$ 50.  
 Microline 83A - 136-column,  
 120 cps, built-in tractor ..... \$ 995.  
 Microline 84 - 136-column,  
 200 cps, built-in tractor ..... \$1395.  
 Optional Serial Interfaces - RS-232C:  
 HS-RS232 - 256 Character Buffer ..... \$ 150.  
 HS-RS232 - 2K Character Buffer ..... \$ 180.



**ASK FOR OUR  
 INSTANT DISCOUNT  
 From Roy Hawthorne  
 Talk To Bill Tokar On  
 Applications**

**CALL TOLL FREE  
 U.S.A.  
 1-800-521-2764  
 MICHIGAN  
 1-800-482-8393**

**Remember:  
 We are open  
 8:30 AM to  
 6:00 PM EST  
 Monday - Friday**



**No Credit  
 Card Penalty**

**"The Stocking Source"  
 24069 Research Drive  
 Farmington Hills, MI  
 48024  
 313-474-6708 ✓296**



keystroke seemed to provide quite adequate feedback, although some of them found the change in tone when shifting to an uppercase letter to be a distraction rather than a help.

Interestingly, almost no one agreed on what color combination of letters and background was the most pleasing, but they all had definite favorites. Several liked black letters on a white screen. Not one person liked the white on green that researchers in the field recommend so highly.

This test application was more rigorous than the use RCA designed the VP3303 for. RCA advertises the VP3303 as "your connection to the computer world." They are obviously targeting it for home and light office use with information utilities, but the test proves that the keyboard is easily accepted by people who use data terminals in their daily work.

### Sound and Lights

The color and musical abilities of the VP3303 can be put to use in several different ways. First, when you use it as a standard data communications terminal, you can arrange your screen the way you want to see it (e.g., blue on yellow). If you want to redefine any or all characters (perhaps to make all lowercase appear as uppercase, etc.), you can do that too.

Second, you can write programs in the host system which can address and move the cursor of the VP3303 all around the screen to draw figures and make the screen change colors and the terminal play music. The host system can be any computer with an RS-232C port. That means the VP3303 can act as a color graphics output device for a system like the TRS-80 Models I, II or III.

The graphics of the VP3303 can be very good. In the high-resolution mode you get 40 characters on 24 lines (low resolution is 20 x 12). Each character location is formed by a 6 x 8 matrix array of pixel dots.

Each ASCII character can be redefined to be any shape or combination of dots within the matrix. As an example, an apostrophe ('), or any other character, can be redefined to be an open square or any other useful shape. The host computer can then draw on the VP3303's screen by redefining characters as needed and sending strings of the right characters in the right places.

Text and graphics are easily mixed on the screen and pictures are painted with colored bits and pieces



*The RCA VP3303 terminals are rugged devices which provide a unique range of capabilities including color or graphics display and sound. They can be connected to nearly any computer as a color display device.*

as the cursor moves around. This method of sending graphics via a slow-speed ASCII channel requires some tedious and repetitive programming, but it works well. A text editing program which holds often-repeated statements would be useful in writing the software needed to get the most out of the VP3303 system.

### Use with the TRS-80

If you use a smart printer like the Epson MX-80 with your computer, you already understand how the VP3303 can be used as a color output device. First, the smart peripheral has to be jolted into paying attention by the receipt of two ESCAPE codes. The command ESC ESC B followed by a number changes the background color on the screen of the TV or monitor attached to the VP3303. That sequence is easy to send from BASIC by entering:

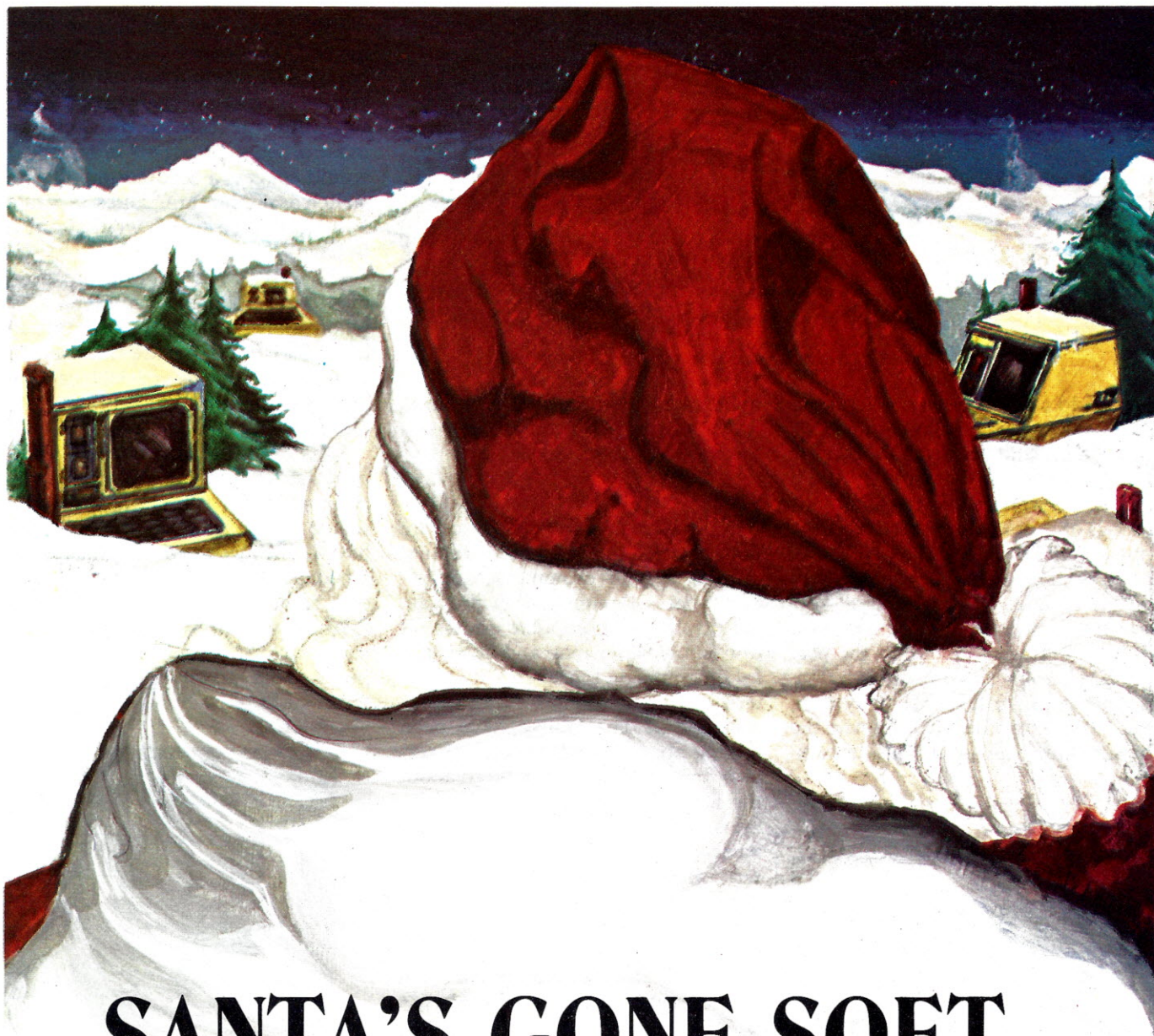
```
LPRINT CHR$(27); REM 27 is the ASCII code for ESC
LPRINT CHR$(27); REM another one
LPRINT "B 5"; REM 5 is the number for yellow
```

All of these commands could be nested together on one line. Don't be confused by the fact that the LPRINT command normally sends the characters out the parallel port instead of the serial. On a system like the TRS-80 Model III, you can simply do a ROUTE command to route the printer output to the serial port.

A Model I program would have to call an appropriate driver routine for the serial port. The VP3303 is wired as data terminal equipment (DTE), which means it wants to receive data on pin 3 of the DB-25 connector. You may have to arrange the connecting cable to transpose pins 2 and 3 if your computer is also wired DTE.

This little program would be ex-





# SANTA'S GONE SOFT...

## TRS-80\* BUSINESS AND APPLICATIONS

ORDER NO.	PROGRAM NAME	PRICE
0316RD	Climate Comp (Disk)	24.95
0287R	Electronic Breadboard (Tape)	49.95
0258RD	Find It Quick (Disk)	49.95
0168R	Label (Tape)	24.95

## TRS-80\* UTILITIES

ORDER NO.	PROGRAM NAME	PRICE
0246R	Compression Utility Pack (Tape)	19.95
0232R	The Disassembler (Tape)	9.95
0180RD	Disk Editor (Disk)	39.95
0139RD	Disk Scope (Disk)	19.95
0231RD	DLDIS (Disk)	19.95
0228R	Dynamic Device Drivers (Tape)	19.95
0199RD	Dynamic Device Drivers (Disk)	24.95
0250R	Irv (Tape)	24.95
0350RD	Irv (Disk)	29.95
0058R	Programmer's Converter (Tape)	9.95
0245R	Programmer's Primer (Tape)	9.95
0133R	Renum/Compress (Tape)	14.95
0230R	TLDIS (Tape)	14.95
5003R	Ultra-Mon (Tape)	24.95

## TRS-80\* EDUCATION

ORDER NO.	PROGRAM NAME	PRICE
0136R	Beginner's Russian (Tape)	9.95
0137R	Everyday Russian (Tape)	9.95
0071RD	Geography Explorer: USA (Disk)	49.95
0212RD	Russian Disk (Disk)	24.95
0127R	Surveyor's Apprentice (Tape)	9.95
0214RD	Teacher's Aide (Disk)	39.95
0099R	Typing Teacher (Tape)	12.95

## TRS-80\* GAMES, SIMULATIONS AND ENTERTAINMENT

ORDER NO.	PROGRAM NAME	PRICE
0017R	Air Flight Simulation (Tape)	9.95
0106R	Airmail Pilot (Tape)	9.95
0240R	Alien Attack Force (Tape)	9.95
0213RD	The All Stars (Disk)	34.95
0051R	Ball Turret Gunner (Tape)	9.95
0141R	Battleground (Tape)	9.95
0223R	Cosmic Patrol (Tape)	14.95
0224RD	Cosmic Patrol (Disk)	19.95
0237R	Danger In Orbit (Tape)	14.95
5006R	Dragonquest (Tape)	15.95
5007RD	Dragonquest (Disk) Model I	21.95
5010R3D	Dragonquest (Disk) Model III	21.95
0218R	Dr. Chips (Tape)	9.95
0171R	Flight Path (Tape)	14.95
0205RD	The Flying Circus (Disk)	39.95
0219R	House of 30 Gables (Tape)	9.95
0159R	Jet Fighter Pilot (Tape)	14.95
0378RD	Master Reversi (Disk)	29.95
0117R	Night Flight (Tape)	9.95
0023R	Oil Tycoon (Tape)	9.95
0120R	Perfect Pong (Tape)	14.95
0043R	Santa Paravia & Fiumaccio (Tape)	9.95
0332R	Space Shuttle (Tape)	14.95
0312R	Swamp War (Tape)	14.95
5012R	Temple of the Sun (Tape)	19.95
5011RD	Temple of the Sun (Disk) Model I	29.95

## TRS-80\* HOME AND PERSONAL

ORDER NO.	PROGRAM NAME	PRICE
0084R	Music Master (Tape)	9.95
0151RD	QSL Manager (Disk)	19.95

## APPLE\*\* EDUCATIONAL

ORDER NO.	PROGRAM NAME	PRICE
0339AD	Capitalization (Disk)	34.95
0283AD	Russian Disk (Disk)	24.95

## APPLE\*\* GAMES, SIMULATIONS & ENTERTAINMENT

ORDER NO.	PROGRAM NAME	PRICE
0148A	Air Flight Simulation (Tape)	9.95
0161AD	Apple Fun (Disk)	19.95
0254AD	Dr. Chips (Disk)	14.95
0018A	Golf (Tape)	9.95
0025A	Mimic (Tape)	9.95
0079A	Oil Tycoon (Tape)	9.95
0163AD	Paddle Fun (Disk)	19.95
0080A	Sahara Warriors (Tape)	9.95
0174A	Santa Paravia & Fiumaccio (Tape)	9.95
0229AD	Santa Paravia & Fiumaccio (Disk)	19.95
0183A	Skybombers II (Tape)	9.95
0271AD	Skybombers II (Disk)	19.95

## APPLE\*\* HOME AND PERSONAL

ORDER NO.	PROGRAM NAME	PRICE
0235AD	Solar Energy for the Home (Disk)	34.95
0242AD	Astrology (Disk)	19.95

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

## TO ORDER:

See your local Instant Software dealer  
or call toll-free 1-800-258-5473

orders only

In New Hampshire 1-603-924-7296

Mon.-Fri. 8:00 am - 4:30 pm E.S.T.

# Instant Software™

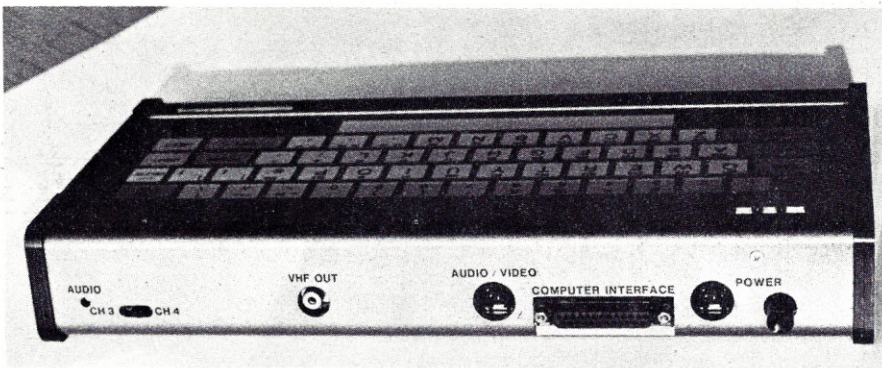
Peterborough, N.H. 03458 USA

A division of Wayne Green Inc.



\*TRS-80 is a trademark of Radio Shack a division of Tandy Corporation  
\*\*APPLE is a trademark of Apple Computer Inc.





The rear panel of the VP3303 contains all the connectors and a few switches.

tended to send a graph or picture to the VP3303's screen. Similar LPRINT commands could be used to redefine how the terminal displays ASCII characters, moves the cursor, sends strings of characters and activates the music function.

On the TRS-80, the program would be written from the standard keyboard and the terminal would be used only as a display device. If the program is being written on an information utility or large computer system, the VP3303 can be used to write the program and display it. Various com-

mands which will return the desired ASCII characters from remote systems are available.

### Color on the Utilities

CompuServe and The Source are both close to offering color graphics service to their customers. CompuServe has a demonstration program on display at computer shows. It draws a weather map and other useful diagrams on the screen of a color terminal.

People at The Source have been talking about the same kind of service, but there is no firm word about the format to be used. The CompuServe color graphics format will not work with the VP3303. (You can write your own programs on CompuServe and they will play very well, but the utility's prepackaged pictures will not be displayed.)

The Source apparently will not use the CompuServe format, but it isn't clear what they will use. The industry still needs to sort itself out in the area of format, but for now the RCA VP3303 provides a fine way to display color graphics on big and small computers that think they are only spouting strings of ASCII characters.

### Nitpicks

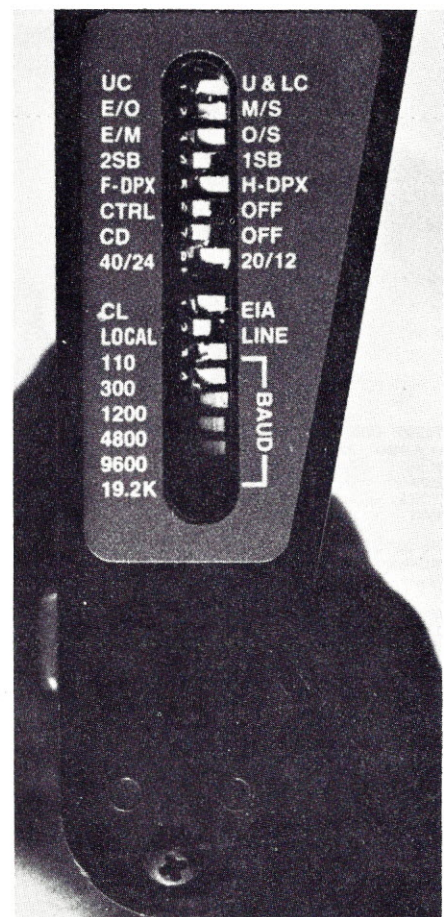
You can't have a fair review without a nitpick or two. The RCA VP3303 is a flexible, good-looking and rugged terminal device available at a reasonable price. But if you are going to use it actively (changing colors, etc.), you have to frequently manipulate a DIP rocker switch available through the left side of the case.

I often wanted to go off-line and into the half-duplex mode to "talk to myself" locally on the TV set, and set colors and experiment with graphics before trying to write a program. But this required manipulation of the rocker switch with some tiny, point-eed instrument.

The "local-line" switch is right next to the switch which selects between RS-232C and current loop operation. You could easily knock yourself into the wrong transmission mode when selecting on- or off-line. I would suggest a separate on/off line switch as a minimum, and a separate half/full-duplex switch would be nice to have.

The DIP switch setting arrangement won't bother an installed user who simply wants to turn the system on and go, but if you are learning the system or doing any special local programming to use its capabilities, the DIP switches can be a nuisance.

The VP3303 has a built-in video modulator to provide a channel 3 or 4 rf signal to a TV set. The Model 3301, which sells for a little less, does not have the rf modulator. This family of terminals can provide a fine low-cost data communications capability, but they can also provide unique graphics, color and sound from any computer able to interface with a terminal. ■



There is a line of DIP switches on the left side of the VP3303 which sets most of the operational parameters. Everything is easy to use, but having the local-line switch in this location can become a nuisance if it is needed frequently.



# apple®

**November Bargains!**

**DISK BASED SYSTEM:** Apple II or Apple II Plus with 48k RAM installed, Disk II with controller, DOS 3.3 ..... \$1899

**THE SOURCE® FREE!** Buy the D.C. Hayes Micromodem II® for \$379.95 and we'll give you The Source (\$100 value) Free!

**SUPER SALE!** IDS 445G Paper Tiger® printer with graphics option ..... only \$695

**SMARTERM® 80-column board...**

**CALL TOLL FREE \$299**  
**(800) 621-5802**




## ERICKSON

### COMMUNICATIONS

Chicago, IL 60630

5456 North Milwaukee Ave.

(312) 631-5181 (within Illinois)



# **Ever tried to read computer sales literature?** **Ever tried to talk to a computer salesman?** **Ever tried to make a decision about** **which computer to buy?**

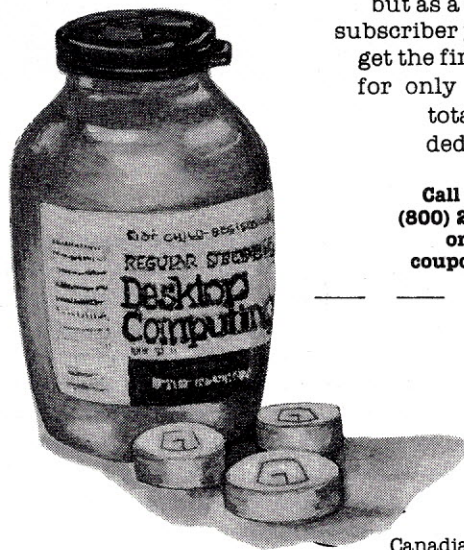
Yes... then you know what frustration is. Help is on its way. Desktop Computing premier this fall. The first and only computer magazine written in plain English. Preposterous? Not at all. It is possible to explain computers without all the "computerese." That is what Desktop Computing will do each month. Send the card today for a no-risk subscription that will give you the kind of understandable, useful information on computers you've been waiting for.

Why do you need a plain-English explanation of desktop computers? Because they have just come of age and are saving thousands of businessmen like you an amazing amount of money. They not only save money, do things faster, provide access to more information, allow a smaller staff to do more work, they also allow you to get into services for your customers which were not practical before. You can provide more services at lower cost. To get in on the savings and expanded customer services, you need information. Desktop Computing will bring you that information. Desktop Computing will cut through all the technical hocus-focus.

In this time of high interest rates, a truly low cost desktop computer system (usually a micro-computer system) is a welcome event. Let Desktop Computing explain what these systems can do for you. The subscription price is \$25 a year

but as a charter subscriber you can get the first year for only \$17.97, totally tax deductible.

Call toll-free:  
**(800) 258-5473**  
 or mail the coupon below.



Here's a look at some of the articles \$17.97 will bring you:

- When a small Business Computer Arrives, What Happens to the Small Business?
- Letter to Hemingway RE: Word Processing
- Professional & Small Business Microcomputers: Buying, Using and Fixing a System.
- Adequate Backup: Protecting the Data in Your Computer.

Wayne Green, the publisher of Desktop Computing (and also of Kilobaud Microcomputing and 80 Microcomputing—both successful computing publications) has gone through both the agony and joys of working with computers. He has lost a quarter of a million on a mainframe big boy computer only to come out on the other side with all the frustration necessary to run a 200 employee publishing firm on several TRS-80's.

Wayne has a reputation for being honest and unafraid. He'll make sure you get the truth. In the meeting introducing the idea of Desktop Computing to his staff Wayne said,

"Our objective is to be the only computing magazine written in plain English."

So that is what you'll be getting—honesty and directness. Desktop Computing will give you all the information you need on computers in plain English.

This charter subscription is available for a short time only. Send the card today for the premier issue—October 1981—and get the information you've been needing for only \$17.97.

**Desktop Computing**  
A WAYNE GREEN PUBLICATION

**Relief is here for only \$17.97**

☐ **YES** Sign me up as a Charter Subscriber to Desktop Computing. I will get one year of the only computing magazine written in plain English for \$17.97 (a savings of 50% off the newsstand). My subscription will begin with the premier issue—October 1981.

Your first issue will be arriving by mid-October 1981.

Canadian 1 yr. only/US funds \$19.97 Foreign 1 yr. only/US funds \$29.97

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_

SIGNATURE \_\_\_\_\_ EXPIRE DATE \_\_\_\_\_

CARD # \_\_\_\_\_ INTERBANK # \_\_\_\_\_

Desktop Computing  
 80 Pine Street Peterborough, NH 03458

31NC7



## ENGINEERING AND PRODUCTION CONTROL SYSTEMS



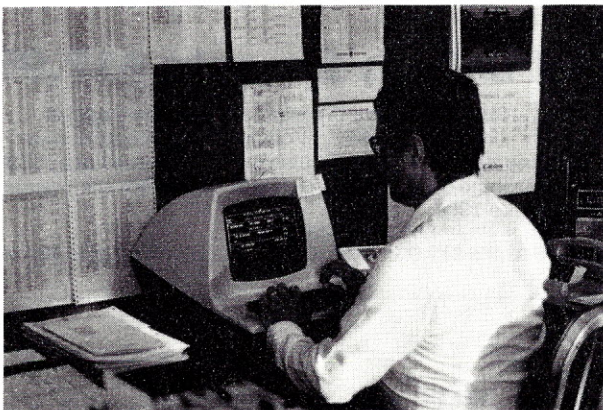
*Company founder and president, Walter L. Myers (right), pictured with production engineer Joe Zellers who developed the production control software for the MSI computer system.*

system. Since 1975, the MSI system has been expanded to accommodate four users simultaneously, performing a variety of plant monitoring functions and management programs."

"The system is equipped with 10 megabytes of hard disk storage presently and we plan to add an additional 10 megabytes of storage soon. The maximum downtime has been only one or two days in the 5 years that the system has been in operation. MSI has provided excellent technical support and willingness to help us with our special requirements. We have nothing but praise for MSI, they have provided excellent system support."

### SPRING ENGINEERING AND DESIGN

"All of the production at Myers Spring is performed to exact customer specifications rather than to the manufacture of standard spring products. This causes an ever increasing demand for quick and efficient design and engineering capabilities. Many parameters have to be taken into consideration in the design of any particular spring, including wire size, wire type, material modulus, spring diameter, number



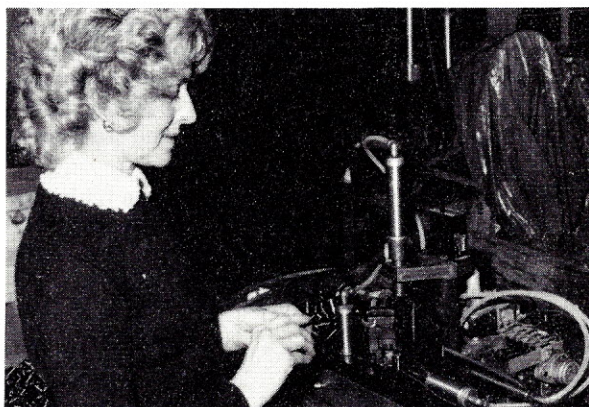
*One of four workstations where design engineering, checking of sales order status, and production control monitoring is performed.*

### THE COMPANY:

**MYERS SPRING COMPANY, INC.  
LOGANSPOUT, INDIANA**

Myers Spring Company, Inc. was founded 35 years ago by Walter L. Myers for the manufacture of small mechanical springs which are used widely in mechanical appliances, electrical equipment, and by the automotive, construction, and many other industries. The Myers Spring company has grown to several million dollars in annual sales and employs approximately 50 people in its production facility.

Production engineer Joe Zellers comments, "we began looking at computer systems approximately ten years ago in order to keep up with the increasing demand of order processing, custom mechanical spring design engineering, and production control. In 1975, we selected the MSI system because they were the first company in the microcomputer industry to offer the necessary peripherals which would convert a microcomputer system into a usable business



*The production facility at Myers Spring Co. is equipped with many automated machines for mechanical spring production.*

of turns per inch, free length, spring loading, rate, solid height, working stress, working temperature, number of operating cycles, hysteresis, resonant frequency, expansion, and whether the spring has to be ground or not. It used to take over an hour for an engineer to design a spring taking into account all of these parameters. However, with the engineering software which we have developed for the MSI system, spring design can be completed in less than one minute by simply keying in the desired parameters. The MSI computer system not only designs the spring for us but prepares a complete quotation for the customer after consideration of the material to be used, the amount of waste, which equipment the production will use, the speed of the machines, the necessary labor rate, as well as the desired percentage of profit."



### SALES QUOTATION SYSTEM

Following the computer spring design procedure, with automatic quotation feature, the actual production begins. Each quotation is reviewed and compared to actual job cost reports on the production run in order to make any necessary refinements in the quotation system software. This feature of our system has greatly improved our ability to prepare accurate quotations and to insure profitability of the company.

### PRODUCTION CONTROL/JOB COST ACCOUNTING

Each production work order is tracked by the computer system at each stage of the production process. First, each order is checked against the customer quotation for accuracy. As each order is processed, exact shop labor time is recorded, for each production machine used, and each stage of the production process. Summary reports are produced showing the total amount of material used, time used on each production machine, amount of material used, and a total cost figure for each work order.

### SALES SUMMARY REPORTS

The system is designed to produce monthly sales summaries which show the amount of products sold by each salesman, complete with dates, order numbers, type of product, quantity, type of material, material cost, sales commissions, etc. Totals for each desired category and for each salesman are reproduced.

### ACCOUNTS RECEIVABLE SYSTEM

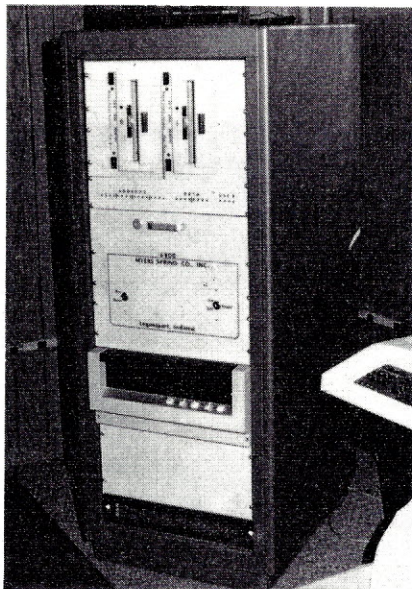
Each morning, invoices are generated for orders which will be shipped that day. The accounts receivable system maintains accounts for over 500 active customers. The system produces monthly statements complete with aging of open invoices.

### MULTI USER CAPABILITY

The MSI system is equipped with four user terminals presently which are available for use simultaneously by the following departments: Order department, for entering new orders and checking order status. Inventory department, used for checking to see whether a particular product has been produced previously. Invoicing/Cost Accounting, used for preparation of invoices and for entry of labor and material cost accounting information. Design Engineering, used by company engineers to design new products.



*Order entry, invoicing, monthly statements, and other management reports are carried out at this workstation at Myers Spring Co.*



*The MSI system at Myers Spring Company is equipped with 10 megabytes of hard disk memory, dual floppy disk drives, a high speed printer, and four user CRT terminal workstations.*

### GENERAL LEDGER TIE-INS

The MSI system automatically prepares journals for cost accounting information and sales data which can then be posted to the general ledger. Complete income statements and balance sheets are produced by the general ledger programs on the system.

### MULTIPLE MANAGEMENT REPORTS

The MSI system is used in many different areas of the company in order to provide more efficient and effective management of our production facilities. Several of the reports which we obtain from the system are: **production schedules, due list for orders, new orders list, production summary by department, salesman's reports, individual customer reports and order histories, time studies, sales quotations, design engineering, sales summaries, customer statements, general ledger balance sheet and income statements.**

**Consider MSI, evaluate us, talk to our users, and we think you'll buy your business system from us!**

If you would like to know how an MSI business system can help you make your business more profitable, call or write, **MIDWEST SCIENTIFIC INSTRUMENTS, INC., 220 W. Cedar, Olathe, KS 66061, 800-255-6638, Telex 42525 or 437049**



---

*The day when we can affordably hook our micros up to the television camera is fast approaching. Until then, let's imagine the ideal "eye for your computer."*

---

# Lights . . . Camera . . . Action

By James M. Hansen

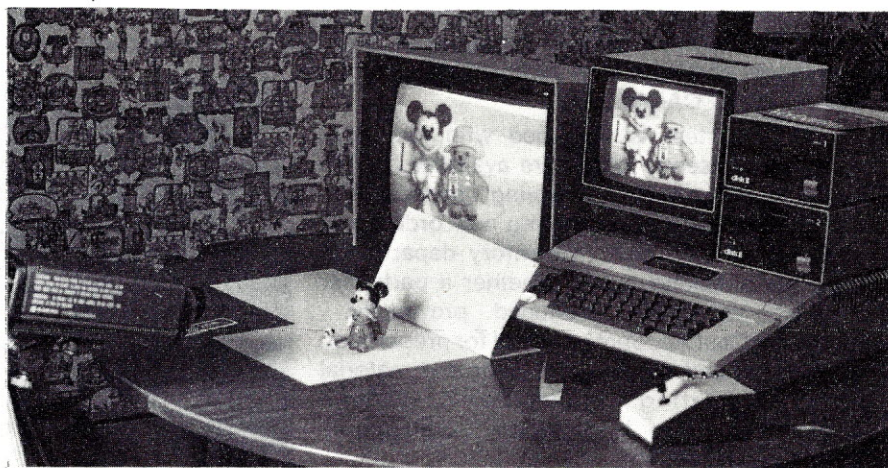
Of the many microcomputer peripherals available, the television camera is probably the most fascinating. The gift of sight to a computer can open the door to a host of uses not otherwise possible, including motion study, cartography, image analysis and robotics.

While I don't want to get too bogged down in detail, I want to discuss some of the problems of making a high-performance television interface. Hardware is now available, and affordable enough so that advanced hobbyists can actually start planning such an interface.

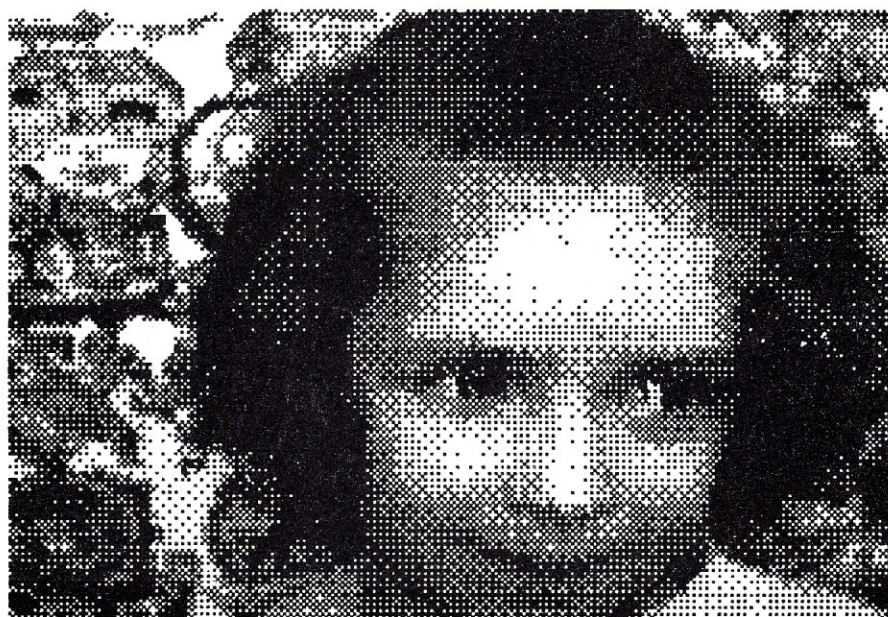
The ideal interface should accept any standard television signal, digitize it (convert the picture portion into a string of numbers) and place it into memory. Further, it should do this to a single frame; that is, one complete scan of the picture. This takes 1/30 of a second for U.S. television signals.

The successful interface should also be able to display the image on a monitor with the same resolution that was used to digitize the original image. System resolution must be at least as good as that seen on a standard home television set.

Our ideal interface would also provide at least 32 shades of gray scale. This corresponds to five bits of information for every dot that you digitize. The more shades of gray you can get, the more natural the shading of the pictures you digitize. Line drawings, maps, cartoons and the like generally look fine with only one bit of information (dot on or off) per displayed



*Photo 1. The photographic setup used to make the stereo pictures. The larger monitor displayed the picture directly from the camera, and the smaller monitor atop the Apple shows the digitized image. Careful lighting is necessary to get maximum detail.*



*Sample 1. This is a picture of one of my children. One of the problems of child photography is getting them to hold still long enough (three or four seconds) for the entire image to be digitized. The background in this case is distracting and probably should be something with little or no pattern.*

---

*Address correspondence to James M. Hansen, Box 234, New Boston, NH 03070.*

---



dot, but actual photographs and most other video images require a gray scale to be recognizable.

This, then, is the ideal interface: with the press of a button, it will snap up a single frame of video from almost any source, put it into some kind of digital memory which can be read and stored on disk in normal computer fashion, and display the frame on a monitor with picture fidelity as good as that found on most network broadcasts. Can it be done today at a reasonable cost?

### Yes, If . . .

The answer is yes, if you design and build it yourself.

Let's look at what we have to understand to build the ideal interface.

First, the video signal. Fig. 1 shows in some detail the standard used in the United States. The major portions that concern us are the vertical interval, which will indicate the beginning and end of a picture frame, the horizontal sync and blanking pulse and the video portion of the signal.

A complete video frame consists of 525 horizontal lines. The frame is made up of two fields. Each field consists of 12-1/2 lines that provide vertical synchronization information and 250 lines that contain picture information. The fields are overlapped so that one provides information for even horizontal lines in the picture, the other odd lines.

The odd field starts its scan in the center of the top line of the picture, and the even field begins at the top left of the picture, under the first line of the odd field. Each field is completely scanned in 1/60 of a second, and so a frame is completed in 1/30 of a second. The timing of the fields was chosen so that 60 cycle hum and interference would be less noticeable since it would be in sync with the picture and thus stationary (or nearly so).

Fig. 2 shows a block diagram of our ideal television interface. It consists of a video analog-to-digital converter and a high-speed memory to hold the digitized image, complete with an interface to your computer. A digital-to-analog converter and attendant logic to add vertical and horizontal sync signals for output to a monitor are also included in the interface.

The critical elements that determine the maximum picture fidelity are the analog-to-digital converter (ADC), memory speed and size, and the digital-to-analog converter (DAC). We will assume that suffi-

cient hardware exists to strip out the sync portion of the video signal and synchronize the ADC properly to grab a frame starting at the beginning of the frame, rather than starting at some random place in the picture.

There are several types of analog-to-digital converters. For our purposes we will divide them into two classes: fast (of the flash variety), and slow (which use successive approximation or other standard techniques to digitize analog signals). It is now possible to buy single-chip monolithic ADC converters in the \$10 range which do a respectable job. They are slow by video standards, but for this example, let's say that we located one that would do a single conversion to eight bits in ten microseconds ( $\mu$ s).

Since each horizontal line takes

about 63  $\mu$ s, at best this converter will give us 6.3 data points every horizontal line. It is therefore not acceptable for the ideal interface, but let's not drop it yet. We could divide up the horizontal line into, for example, 1200 data points and use this converter to digitize six points of every line each frame. If we move the six points we digitized a little every time, we could completely digitize a frame of video in 200 frames. At 30 frames per second, that works out to 6-2/3 seconds, practical for image reproduction of still objects at quite good resolution.

The real answer to our ADC requirement is the flash converter. This type of converter is fundamentally different from other converters. The normal, slow type of converter digitizes a signal by generating a test volt-

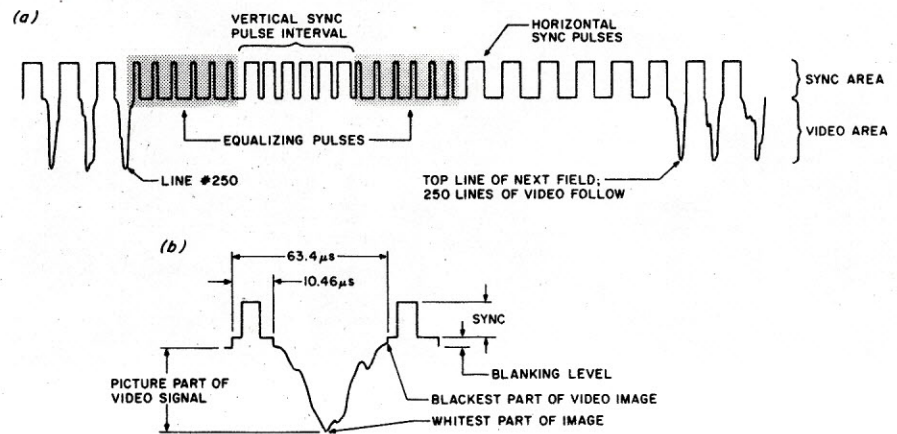


Fig. 1. Standard (U.S.) television video waveforms. Fig. 1a depicts a complete field showing the vertical sync area, horizontal sync pulses and picture areas. The equalizing pulses surrounding the vertical sync pulse interval maintain horizontal sync in the television monitor during the vertical interval and provide for odd-even fields mentioned in the text. Fig. 1b shows the waveform for an individual scan line. The time for one line is shown for a black and white picture. Color scan times are longer, 63.5  $\mu$ s per line. (This frequency was chosen as 2/455 times the color burst frequency.) The blanking and sync pulses are "blacker than black" since they extend past the blackest area of the video portion of the signal. The blanking pulse is used to turn off the video display while the beam is moved to the left of the picture for the next scan line. Many inexpensive vidicon cameras combine the sync and blanking pulses into a single rectangular pulse.

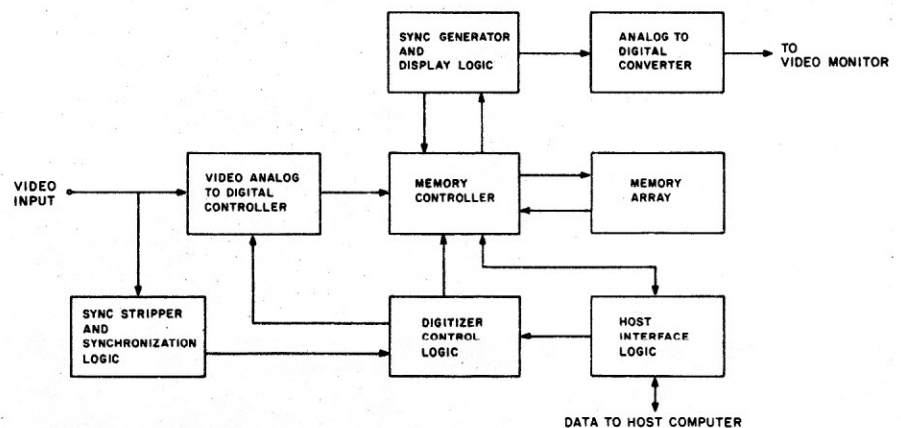


Fig. 2. A block diagram of the ideal television interface.



age and comparing it to the input voltage. The test voltage is adjusted until it matches the input voltage within the tolerance of the converter. Since the converter uses digital techniques to generate the test voltage, the digital value can be read out when the input and test voltages are matched.

The flash converter obtains greater speed by using many comparators (and an equal number of test or reference voltages) simultaneously to determine the input voltage. The out-

puts of the comparators are sent to an encoder that generates the digital value of the input voltage. If we had an eight-bit flash converter, it would have 256 comparators and voltage references built into it. Getting all the comparators and voltage references to be accurate in relation to each other, plus mixing analog and digital logic on one chip is no mean feat, but it is now done by both TRW and Analog Devices.

TRW's converters have been on the

market for some time, and command a fairly high price. Analog Devices has just introduced two monolithic flash converters, the AD5010KD and AD6020KD. They are packaged in a 16-pin DIP and are priced at \$189 and \$84, respectively, in hundreds. All that is required is two power supplies, an input signal and a TTL encode command.

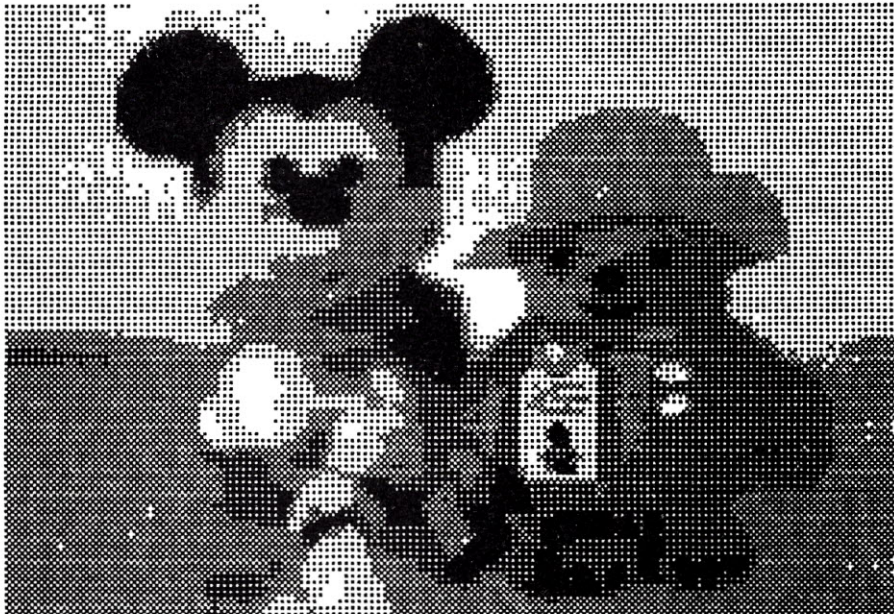
The AD6020 digitizes data at rates up to 50 million conversions per second, and the AD5010 up to 100 million. That translates to 20 nanoseconds (ns) for the slow one, and 10 for the fast one. Since the data can be encoded faster than the gate propagation times (the time it takes an input signal to reach the output of a gate) of standard TTL logic, these converters will require use of Schottky or ECL logic to be run at full speed.

Look at the resolution we can get using these relatively low-cost devices. A conversion rate of 20 ns/conversion gives 50 samples per  $\mu$ s, or about 3200 readings on a single horizontal video line. This is clearly sufficient for our ideal video interface. Since these converters digitize to six bits, we will get 64 shades of gray, again satisfactory for our interface.

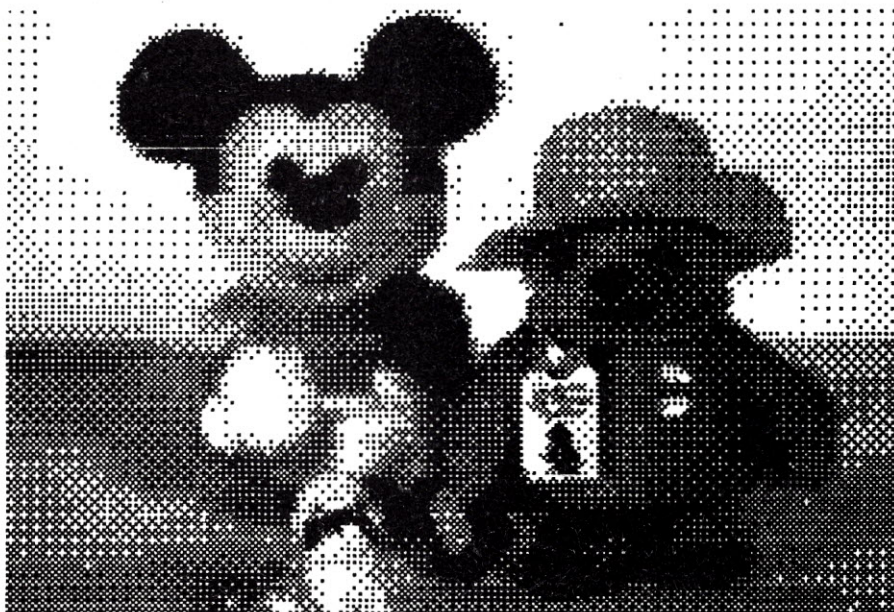
Before you rush out and buy your converter, I want to quote a sentence from the Analog Devices announcement: "...it is important to note that the design principles for high-speed conversion have not been revoked by the availability of a chip that does most of the work." They also mention that a complete board for prototyping is available. It would appear that it is now possible to build the front end of our high-performance video interface with confidence it will work.

Next we must design a memory that will accept data at the rate our converter produces it. First we should look at how much memory we need. This is entirely dependent on the desired resolution. Say that we would like 1024 dots (picture elements, or pixels) per horizontal scan line. Since there are 500 lines in the frame, we are talking about a half megabyte of memory, a practical amount by today's standards. Our problem here is that there aren't too many cheap 20-60 ns memories around.

The memory array we need would consist of 32 banks of 16K byte memory chips, or eight banks of 64K parts. Since 64K memory chips are quite expensive and/or not readily available,



Sample 2. Mickey Mouse (patron saint of computer hackers everywhere) and Paddington Bear were two figurines chosen for several experiments. Sample 2a (top) shows the image with a dither matrix of two (four shades of gray); 2b (bottom) used a matrix of four (16 shades). Notice that the images seem a little fuzzier (loss of detail) in 2b, but are better defined because they are separated from the background. I found that the image displayed on the Apple monitor often looked better than what was printed. It takes a bit of effort to adjust the monitor contrast and brightness to "match" the printer output.





# Doctor:

**New software system turns your TRS-80\* computer into a complete office manager.**

## **Windham Software's Medical and Dental Office Systems economically manage financial and diagnostic office functions.**

If you're a physician or a dentist in a group of up to ten practitioners, you probably feel like you're spending more and more time on things other than caring for your patients — like bookkeeping, insurance forms, billing, collections, record-keeping.

If you consider computerization as a good solution, you're on the right track. We at Windham Software have your answer. We've developed two comprehensive software packages — the MOS-2 for medical offices, and the DOS-2 for dental offices — specifically for groups of up to ten practitioners.

The MOS-2 and DOS-2 from Windham Software are economical packages — priced at \$499 — which include *all* the financial functions you've seen in other available office management systems. But there's more.

The MOS-2 and DOS-2 can handle up to 15,000 patient records — more than any other similar system. Up to 500 procedures and 500 diagnoses can be stored and retrieved on the MOS-2. And both systems provide a full statistical report on procedures performed, and number of patients seen per doctor each month.

## **Designed specifically for groups of up to ten practitioners.**

Some software systems demand a change in your way of doing business, or radical programming alterations — expensive propositions. The Windham MOS-2 and DOS-2 were developed by practitioners working with systems specialists. They have been using the MOS-2 and DOS-2 on the Radio Shack\* TRS-80 Model II to manage their practices for some time. The team also developed the Medical Office System being marketed by Radio Shack for TRS-80 Models I/III (Cat. No. 26-1568). Their experience and understanding have led to the development of a system ready to go to work in your office, as you now operate it.

## **The most comprehensive software package for your TRS-80 Model II.**

The past few years have seen numerous microcomputers introduced to the market. We designed the MOS-2 and DOS-2 to operate on the Radio Shack TRS-80 Model II microcomputer. The Model II is an economical hardware system, fast, adaptable, and with a particularly high capacity. It is readily available and serviced through Radio Shack dealers everywhere. The MOS-2 and DOS-2 perform more functions and have greater storage capacity by far than any other medical or dental software package available for this hardware.

IBM and Hewlett-Packard micro systems available soon.

\*TRS-80 and Radio Shack are registered trademarks of Tandy Corp.

## **What Windham Software Systems can do and how your practice can benefit.**

A wide range of financial and management functions are performed by the MOS-2 and DOS-2. Billing, account aging, payment recording — even insurance forms — are all completed *automatically* by the system. Patient records can be quickly and easily sorted to provide meaningful practice profile information, heretofore nearly impossible to obtain.

The MOS-2 and DOS-2 are so simple to operate — any or all of your current staff can easily be trained to work with a system. No need for computer language — the system communicates with simple English questions and answers. Recording errors are virtually eliminated with the system's verification system. Since many office functions are now completed automatically, much time is saved which can be devoted to other important tasks in your office. Automatic account aging and statement generation also improves collections. Each system is priced at \$499 — a comprehensive, efficient, economical office management package that very quickly pays for itself.

Turn your paperwork over to a specialist — the MOS-2 Medical Office System or the DOS-2 Dental Office System, from Windham Software.

## **How to order.**

Orders may be placed by phone or by mail. Call toll-free 800-424-4320, Operator 20; or in Washington, D.C. 202-822-9090, Operator 20. For further information or a brochure, you may call 203-456-3530. Or fill out the attached coupon and mail it today!

## **Windham Software, Inc.**

29/31 Ivanhill St., Willimantic, CT 06226

✓ 324

Please send me: ☐ MOS-2 Medical Office System  
☐ DOS-2 Dental Office System

I enclose: ☐ Check ☐ Money Order for \$499.

Please charge to my: ☐ MasterCard ☐ VISA ☐ American Express

Acct. No.

Exp. Date:

Inter. Bank No. (for Master Charge)

(Signature for credit card use)

(Total: \$499 each. Connecticut residents, please add 7½% sales tax.)

Name

Address

City/State/Zip

Type of Practice

☐ I'm not ready to order, but please send me your brochure.



we will think along the lines of using 192 16K chips. They can be had for under \$5 each, and so the bulk of our memory unit will cost under \$1000, if you build it yourself.

Since the standard 16K memory access time is around 150 ns, some paging scheme will have to be employed to allow proper setup and access times. We will need to access the memory 1024 times each 63.4  $\mu$ s, which works out to once every 61.9

ns. We can either set up the memory as several pages and write each datum to another page, or splurge and use 120 ns memories and design a two-page system. The two-page system will be easier to design and get running.

The final video section is the playback or memory display section. Here again, high data rates will require a good deal of thought and a fast digital-to-analog converter to realize

high-quality output. There are many suitable fast DACs available. Horizontal and vertical synchronizing signals must also be generated and mixed with DAC output.

Since one of the main objectives of the interface is to allow a computer to process the video image, a third interface to the memory must be provided for computer access. I can see no requirement for either display or data capture during computer access, so this will take some burden off the memory design. It might be interesting to note the time it would take to unload this memory. If the computer access port were set up as a parallel port, and each byte required, say, 50  $\mu$ s to be read by the host, and no disk access time delays were encountered by the host, it would take about 25-30 seconds to read it out. If floppies were used to store the data, you would probably want to devise a special disk format to hold the video data since standard formats have more overhead, thus less capacity.

### But Seriously, Folks

All the foregoing is really a dream. If there are any of you out there that have the financial, technical and grit capacity to build even a subset of the ideal video interface, I would like to talk to you. I would guess it would take over \$2000 to complete and probably six months to a year of intensive effort to get the hardware up and running.

However, there are at least two practical, off-the-shelf television interfaces that are available today. Neither has performance approaching the ideal, but as the fellow who owns a Piper Cub tells the one who dreams of an F-16, "they sure beat hangar flying."

The first has been around for quite some time and is sold by Micro Works (PO Box 1110, Del Mar, CA 92014, 714-942-2400). It is slow, but quite inexpensive and works through a parallel port. My understanding of its operation is that you send it an address and it returns a digital value of the addressed portion of the image. This makes the data it returns similar to that of the ideal interface.

Computer Station (11610 Page Service Drive, St. Louis, MO 63141, 314-432-7019) has recently introduced their Dithertizer II, which I have used for some time. It plugs directly into an Apple interface port and takes less than five minutes to install. It comes with a short manual, a disk with machine-language driver



Sample 3. This is an example of digitized line drawing. Line drawings generally look good as long as the lines are not too thin to be resolved by the Apple screen. Notice the staircasing (also called "aliasing") of the horizontal lines. This is caused by the resolution of the display being so low that the effect is visible. Staircasing will always be present in any digital display; the trick is to use enough lines to make it invisible.



Sample 4. A map of the New London area of New Hampshire. It was made with four shades of gray, which cost detail, but allowed the shading to appear. Some of the larger highway route signs are legible when no gray scale is used, but other details including some roads are lost. Best detail recovery is obtained with strictly uniform lighting and black and white objects.



routines and a BASIC demo program. Your Apple must have a disk. The Dithertizer II requires a TV camera that accepts external sync.

The price of the Dithertizer II and a Sanyo vidicon camera is \$650. This includes a long camera cable, so all you need to start operation is a tripod on which to mount the camera.

The manual is complete and gives good, clear installation instructions, reasonable operating and user information on integrating their various screen-dump programs (see "A Tale of Two Screen Dumps" in the April 1981 issue of *Microcomputing*, p. 174) and a source listing of the BASIC demo program. (If you want screen dump capability, you will have to purchase this program separately.)

Operation of the Dithertizer II is not the same as the ideal interface or Micro Works digitizer. Instead of storing numbers corresponding to the value of the video signal, a translation is made based on the dithering matrix size, and an appropriate number of display dots in the Apple high-resolution graphics display memory is turned on and off to render a gray scale.

All output of the Dithertizer II is sent directly to the video display memory. A dithering matrix of  $1 \times 1$  (no gray scale, only black or white is displayed) to  $8 \times 8$  (64 apparent shades of gray) may be selected. An unfortunate consequence of using larger dithering matrices is that, because of Apple's limited resolution ( $280 \times 192$ ), image detail is lost. Another consequence of storing information in this format is that, while it is perfectly natural for display purposes, it is difficult to process the data in any way other than to store or dump it on a printer.

The demo program, written in BASIC, is designed to let you use the system as soon as you have everything plugged in and running. Both the keyboard and game control paddles are used. Single keystroke commands are issued to the controller to dither (capture a picture), change the dither matrix, stop dithering and freeze the image, save the image to disk, print the image if you have installed their screen dump program for your printer and contour an image (draw an outline of its light and dark borders). The game control paddles are used to adjust the software equivalent of brightness and contrast.

Variables for controlling the dithering and contouring processes as well as machine-language entry points for these routines are clearly spelled out

and can easily be driven by your own BASIC or assembly-language programs. Any questions that may arise are easily answered by reading the source listing of the demo driver program.

I installed the printer driver software for the Paper Tiger 460, and all the print samples shown were printed with the 460. Each of the pictures shows one aspect of the operation of the Dithertizer II. Photo 1 shows the setup I used. I found that uniform lighting was absolutely essential to get the best pictures. Also, a video monitor to observe the video input is

necessary. Without it you cannot tell if the camera is focused or if the image is smudgy because of poor lighting. Getting the hang of adjusting the camera, lights and the game paddles takes a little time.

I tried to use one of the Programma joysticks, but found that the game paddles worked far better for me. It is hard to change just one axis on the joystick, and the backlash in stick movement causes confusion when a small adjustment is required.

The Sanyo camera supplied by Computer Station works well, but the lens does not have an iris. It is not



Sample 5. This was copied from a color advertisement, and dramatically shows the ability of the Dithertizer II to locate the edges of a video image. Sample 5a (top) is the normal picture, and 5b (bottom) the "contoured" version. Careful adjustment of the game paddles is necessary to obtain this clarity.





possible to adjust the depth of field or to compensate for peculiar lighting conditions. It does have a very effective electronic light compensation circuit which can be annoying at times since one small bright spot in the picture area can cause the rest of the picture to be washed out.

The normal beam and target controls are screwdriver adjustable, but the (Sanyo-supplied) manual merely says not to adjust them and lets it go at that. (Could it be that the Japanese are finally learning to write American-style manuals?)

One very good feature of the

camera is that the vidicon can be moved in and out in relation to the lens, thereby allowing it to focus inches away for extreme closeups.

### Many Applications

As can be seen from the various print samples, the Dithertizer II can be used for many applications. It can grab a single frame only when using the  $1 \times 1$  matrix, and takes several seconds when an  $8 \times 8$  (64 gray scale) image is to be digitized. Its resolution is limited to that of the Apple high-resolution graphics display. It is, however, a practical, high-quality

television interface that works without a hitch right out of the box.

The comments in the captions on the print samples explain in detail what was being done to show the various capabilities of the Dithertizer II. My personal impressions of this unit are that it can digitize live television images from a camera and display them to the capability of the Apple's high-resolution graphics display. The catchword here is display. I do not think that it will be possible to do a lot of image processing—that is, computer enhancement and the like—without a considerable amount of work in 6502 assembly language.

But for applications where a television camera, image display and print-out are useful, this is a very workable system. I had originally hoped that the resolution would be sufficient to be useful in storing maps. I found that coloring and shading on typical road maps caused trouble since they appear as different gray levels and smudge. Also, the Apple display just does not have enough resolution.

The search for the ideal video interface goes on. I suspect that in the next couple of years we will see the cost of suitable equipment come down with a corresponding decrease in circuit complexity. When this happens a whole new area of exciting microprocessor development will open up. ■

### References

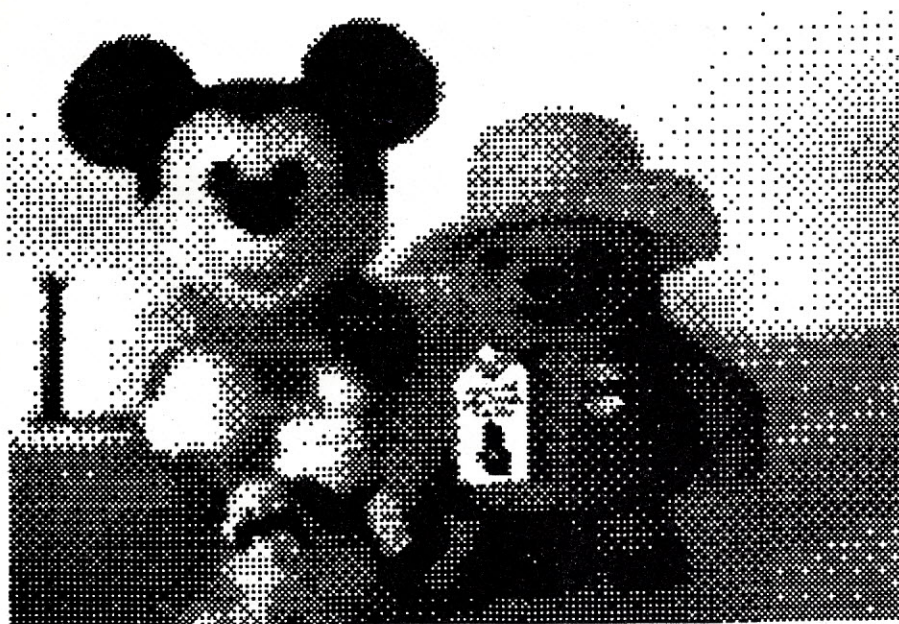
*Reference Data for Radio Engineers*, Fifth Edition. Howard W. Sams & Co., Inc. Complete description of U.S. television standard.

*Data Acquisition Handbook*. National Semiconductor, 2900 Semiconductor Drive, Santa Clara, CA 95051. A catalog of National's data acquisition products including analog to digital converter chips. Some useful application notes.

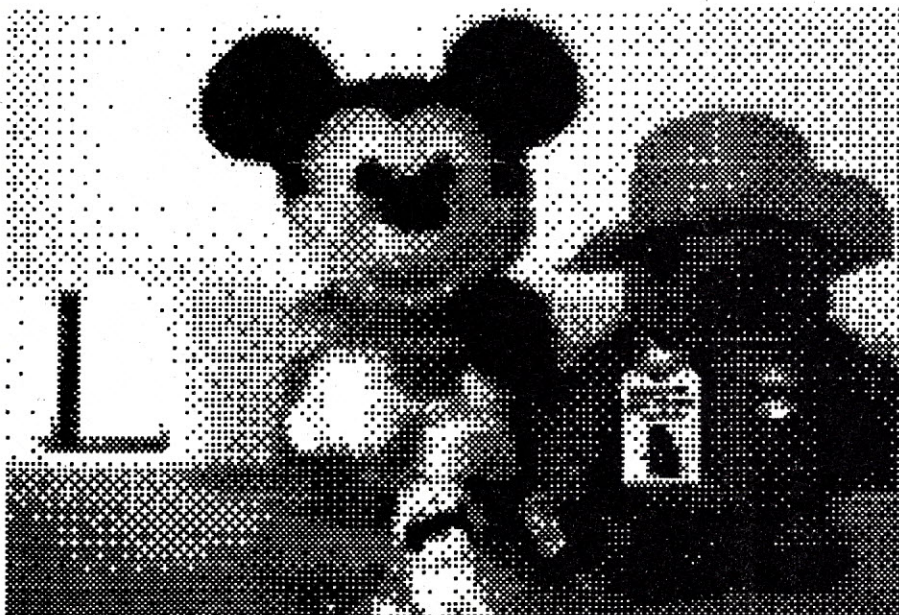
*Analog to Digital Conversion Notes*. Analog Devices, Inc., Box 796, Norwood, MA 02062. A must for anyone working with A-D conversion and analog data processing. A most readable and well-written book. Well worth the \$7.95 price.

*Analog Dialog*—Vol. 15, No. 1. Analog Devices. A description of the AD5010KD and AD6020KD flash converters.

*General Catalog*. Burr-Brown, PO Box 11400, International Airport Industrial Park, Tucson, AZ 85734. A complete listing of their data acquisition products including some application notes.



Sample 6. A stereoscopic pair of pictures. Properly aligned and viewed through a stereoscope, a small dog figurine will appear in front of Paddington Bear, then Mickey to the left and farther back, and finally the L. The pictures were taken in the typical manner, except the camera was moved to the right for the bottom picture.





**NEW! TPM\* for TRS-80 Model II**  
**NEW! System/6 Package**  
**Computer Design Labs**

# Z80\* Disk Software

We have acquired the rights to all TDL software (& hardware). TDL software has long had the reputation of being the best in the industry. Computer Design Labs will continue to maintain, evolve and add to this superior line of quality software.

— Carl Galletti and Roger Amidon, owners.

Software with Manual/Manual Alone

**All of the software below is available on any of the following media for operation with a Z80 CPU using the CP/M\* or similar type disk operating system (such as our own TPM\*).**

**for TRS-80\* CP/M (Model I or II)**  
**for 8" CP/M (soft sector single density)**  
**for 5 1/4" CP/M (soft sector single density)**  
**for 5 1/4" North Star CP/M (single density)**  
**for 5 1/4" North Star CP/M (double density)**

## BASIC I

A powerful and fast Z80 Basic interpreter with EDIT, RENUMBER, TRACE, PRINT USING, assembly language subroutine CALL, LOADGO for "chaining", COPY to move text, EXCHANGE, KILL, LINE INPUT, error intercept, sequential file handling in both ASCII and binary formats, and much, much more. It runs in a little over 12 K. An excellent choice for games since the precision was limited to 7 digits in order to make it one of the fastest around. \$49.95/\$15.

## BASIC II

Basic I but with 12 digit precision to make its power available to the business world with only a slight sacrifice in speed. Still runs faster than most other Basics (even those with much less precision). \$99.95/\$15.

## BUSINESS BASIC

The most powerful Basic for business applications. It adds to Basic II with random or sequential disk files in either fixed or variable record lengths, simultaneous access to multiple disk files, PRIVACY command to prohibit user access to source code, global editing, added math functions, and disk file maintenance capability without leaving Basic (list, rename, or delete). \$179.95/\$25.

## ZEDIT

A character oriented text editor with 26 commands and "macro" capability for stringing multiple commands together. Included are a complete array of character move, add, delete, and display function. \$49.95/\$15.

## ZTEL

Z80 Text Editing Language - Not just a text editor. Actually a language which allows you to edit text and also write, save, and recall programs which manipulate text. Commands include conditional branching, subroutine calls, iteration, block move, expression evaluation, and much more. Contains 36 value registers and 10 text registers. Be creative! Manipulate text with commands you write using Ztel. \$79.95/\$25.

## TOP

A Z80 Text Output Processor which will do text formatting for manuals, documents, and other word processing jobs. Works with any text editor. Does justification, page numbering and headings, spacing, centering, and much more! \$79.95/\$25.

## MACRO I

A macro assembler which will generate relocatable or absolute code for the 8080 or Z80 using standard Intel mnemonics plus TDL/Z80 extensions. Functions include 14 conditionals, 16 listing controls, 54 pseudops, 11 arithmetic/logical operations, local and global symbols, chaining files, linking capability with optional linker, and recursive/reiterative macros. This assembler is so powerful you'll think it is doing all the work for you. It actually makes assembly language programming much less of an effort and more creative. \$79.95/\$20.

## MACRO II

Expands upon Macro I's linking capability (which is useful but somewhat limited) thereby being able to take full advantage of the optional Linker. Also a time and date function has been added and the listing capability improved. \$99.95/\$25.

## LINKER

How many times have you written the same subroutine in each new program? Top notch professional programmers compile a library of these subroutines and use a Linker to tie them together at assembly time. Development time is thus drastically reduced and becomes comparable to writing in a high level language but with all the speed of assembly language. So, get the new CDL Linker and start writing programs in a fraction of the time it took before. Linker is compatible with Macro I & II as well as TDL/Xitan assemblers version 2.0 or later. \$79.95/\$20.

## DEBUG I

Many programmers give up on writing in assembly language even though they know their programs would be faster and more powerful. To them assembly language seems difficult to understand and follow, as well as being a nightmare to debug. Well, not with proper tools like Debug I. With Debug I you can easily follow the flow of any Z80 or 8080 program. Trace the program one step at a time or 10 steps or whatever you like. At each step you will be able to see the instruction executed and what it did. If desired, modifications can then be made before continuing. It's all under your control. You can even skip displaying a subroutine call and up to seven breakpoints can be set during execution. Use of Debug I can pay for itself many times over by saving you valuable debugging time. \$79.95/\$20.

## DEBUG II

This is an expanded debugger which has all of the features of Debug I plus many more. You can "trap" (i.e. trace a program until a set of register, flag, and/or memory conditions occur). Also, instructions may be entered and executed immediately. This makes it easy to learn new instructions by examining registers/memory before and after. And a RADIX function allows changing between ASCII, binary, decimal, hex, octal, signed decimal, or split octal. All these features and more add up to give you a very powerful development tool. Both Debug I and II must run on a Z80 but will debug both Z80 and 8080 code. \$99.95/\$20.

## ZAPPLE

A Z80 executive and debug monitor. Capable of search, ASCII put and display, read and write to I/O ports, hex math, breakpoint, execute, move, fill, display, read and write in Intel or binary format tape, and more! on disk

## APPLE

8080 version of Zapple

**NEW! TPM now available for TRS-80 Model III!**

## TPM\*

A NEW Z80 disk operation system! This is not CP/M\*. It's better! You can still run any program which runs with CP/M\* but unlike CP/M\* this operating system was written specifically for the Z80\* and takes full advantage of its extra powerful instruction set. In other words its not warmed over 8080 code! Available for TRS-80\* (Model I or II), Tarbell, Xitan DDDC, SD Sales "VERSA-FLOPPY", North Star (SD&DD), and Digital (Micro) Systems. \$79.95/\$25.

## SYSTEM MONITOR BOARD (SMB II)

A complete I/O board for S-100 systems. 2 serial ports, 2 parallel ports, 1200/2400 baud cassette tape interface, sockets for 2K of RAM, 3-2708/2716 EPROM's or ROM, jump on reset circuitry. Bare board \$49.95/\$20.

## ROM FOR SMB II

2KX8 masked ROM of Zapple monitor. Includes source listing \$34.95/\$15.

## PAYROLL (source code only)

The Osborne package. Requires C Basic 2.  
 5" disks \$124.95 (manual not included)  
 8" disks \$ 99.95 (manual not included)  
 Manual \$20.00

## ACCOUNTS PAYABLE/RECEIVABLE (source code only)

By Osborne. Requires C Basic 2  
 5" disks \$124.95 (manual not included)  
 8" \$99.95 (manual not included)  
 Manual \$20.00

## GENERAL LEDGER (source code only)

By Osborne. Requires C Basic 2  
 5" disks \$99.95 (manual not included)  
 8" disks \$99.95 (manual not included)  
 Manual \$20.00

## C BASIC 2

Required for Osborne software. \$99.95/\$20.

## SYSTEM/6

TPM with utilities, Basic I interpreter, Basic E compiler, Macro I assembler, Debug I debugger, and ZEDIT text editor.

Above purchased separately costs \$339.75  
 Special introductory offer. Only \$179.75 with coupon!!

# \$160.

This Coupon is Worth  
One Hundred And Sixty Dollars  
Toward The Full Price Of The  
SYSTEM/6 Package  
System/6 with this coupon is only \$179.95.  
This is a limited time offer.

## \$160.00

## ORDERING INFORMATION

Visa, Master Charge and C.O.D. O.K. To order call or write with the following information.

1. Name of Product (e.g. Macro I)
2. Media (e.g. 8" CP/M)
3. Price and method of payment (e.g. C.O.D.) include credit card info. if applicable.
4. Name, Address and Phone number.
5. For TPM orders only: Indicate if for TRS-80, Tarbell, Xitan DDDC, SD Sales (5 1/4" or 8"), ICOM (5 1/4" or 8"), North Star (single or double density) or Digital (Micro) Systems.
6. N.J. residents add 5% sales tax.

Manual cost applicable against price of subsequent software purchase in any item except for the Osborne software.

**For information and tech queries call  
 609-599-2146**

**For phone orders ONLY call toll free  
 1-800-327-9191**

**Ext. 676**

(Except Florida)

## OEMS

Many CDL products are available for licensing to OEMs. Write to Carl Galletti with your requirements.

- \* Z80 is a trademark of Zilog
  - \* TRS-80 is a trademark for Radio Shack
  - \* TPM is a trademark of Computer Design Labs. It is not CP/M\*
  - \* CP/M is a trademark of Digital Research
- Prices and specifications subject to change without notice.

**DEALER INQUIRIES INVITED.**

**COMPUTER  
 DESIGN  
 LABS**

342 Columbus Avenue  
 Trenton, N.J. 08629



# Japanese Invasion: Part 3

By G. Michael Vose  
*Microcomputing* Technical Editor

**W**hile Casio and Sharp have managed to produce competitive new microcomputers for the American marketplace, the most talked-about new Japanese computer is the Nippon Electric Company's (NEC) PC-8000. This Z-80 based machine has been favorably compared to California's Apple computer. Because of the similarity, industry experts seem to feel that NEC has the best chance of securing a significant slice of the U.S. personal computer market.

The PC-8000 (when will the Japanese name a computer the "Cherry Blossom" or the "Mt. Fuji"? ) supports color, is as fast as the Apple or the TRS-80 and has a competitive price tag. NEC has done its homework, too,

in preparing the kind of solid, professional support that fancy hardware needs—software, documentation and training materials.

## The PC-8000

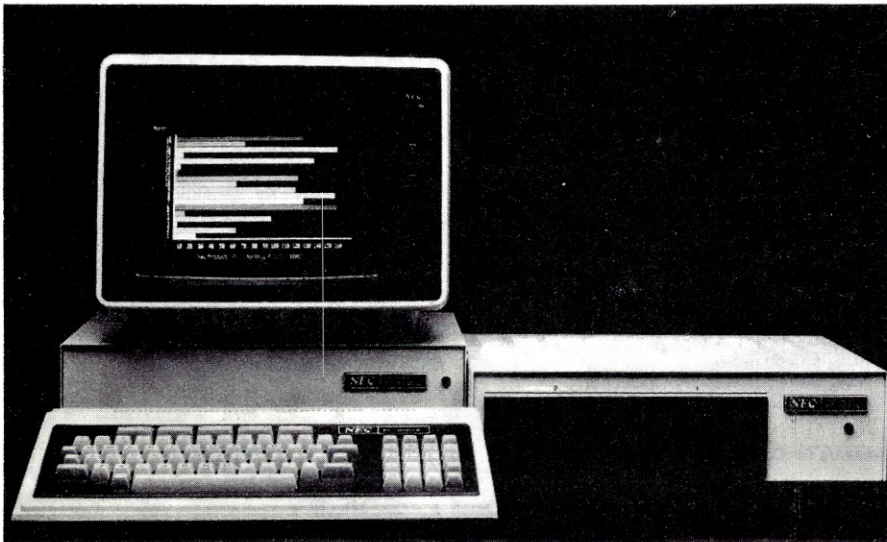
NEC's new microcomputer is an amalgam of several separate components. The PC-8001A keyboard unit contains the microprocessor and 32K bytes of user memory. The PC-8011A expansion unit that came with the unit tested here at the *Microcomputing* editorial offices contained an additional 32K bytes of user memory plus a 24K byte N-BASIC ROM interpreter and an 8K byte custom PROM, the PC-8031A dual disk drive unit and the PC-8041A monochrome monitor. Sys-

tem options include the PC-8032A disk unit, which permits expansion of the system to four-drive capacity; a PC-8023A dot matrix printer; the PC-8043A color monitor; the PC-8012A expansion unit (this expansion unit has more I/O ports than the PC-8011A); and a cassette tape recorder.

All components are housed in metal or plastic cases; the color of the components is a standard off-white or cream color. The monochrome monitor has a green phosphor screen which will support 80 or 40 characters by 20 or 25 lines. The N-BASIC command, WIDTH *x,n* (where *x*=characters and *n*=lines), allows you to control the display size.

The keyboard features 77 keys plus five special-function keys. These keys are separated into a standard typewriter-like keyboard and a numeric keypad. There is a standard English character set, and an alternate Greek character set which can be called by simply pressing the ALT CHAR key. There is also a graphics character set, which is called by pressing the GRPH key. This graphics set includes lines, circles, dots, triangles, playing card symbols and a variety of other graphics images.

The PC-8000 features inverse video



The NEC PC-8000 system includes a monitor and dual double-density disk drive unit.

---

G. Michael Vose is a technical editor for *Microcomputing* magazine. His review of the Casio FX-9000P appears on page 101 of the September issue, while his review of the Sharp YX-3200 is on page 90 of the October issue.

---



# THE ORIGINAL MAGAZINE FOR OWNERS OF THE TRS-80™\* MICROCOMPUTER

\* TRS-80™ IS A TRADEMARK OF TANDY CORP.

SOFTWARE  
FOR TRS-80™  
OWNERS

# COMPUTRONICS INC.

MONTHLY  
NEWSMAGAZINE  
FOR TRS-80™  
OWNERS

## MONTHLY NEWSMAGAZINE Practical Support For Model I, II & III

- PRACTICAL APPLICATIONS
- BUSINESS
- GAMBLING • GAMES
- EDUCATION
- PERSONAL FINANCE
- BEGINNER'S CORNER
- NEW PRODUCTS
- SOFTWARE EXCHANGE
- MARKET PLACE
- QUESTIONS AND ANSWERS
- PROGRAM PRINTOUTS
- .... AND MORE

## NOW IN OUR 4th YEAR

PROGRAMS AND ARTICLES PUBLISHED IN RECENT ISSUES  
INCLUDE THE FOLLOWING:

- FINCALC - A COMPLETE FINANCIAL APPLICATIONS PACKAGE
- INFORMATION SYSTEM REVIEW
- STATISTICAL COMBINATIONS
- PASCAL'S TRIANGLE
- ASSEMBLY LANGUAGE FOR BEGINNERS
- DISK FILES
- MOD-III REVIEW
- KEYBOARD THUNDER AND LIGHTING EXPLAINED
- DOS COMMANDS IN LEVEL II
- PROBABILITY CURVE GENERATOR
- CALCULATOR SIMULATIONS
- THE MEGABYTE GAP
- STOCKS AND BONDS
- BUDGET ANALYSIS (FOR BUSINESS AND HOME)
- NEWDOS/80 REVIEW
- DUTCHING - THE HORSE SYSTEM THAT CAN'T LOSE
- A SIMULATED GOLF GAME
- CONTINUOUS FORM SOURCES
- TAX/SAVER REVIEW
- .... AND MORE

**FREE\*** WITH  
YOUR  
SUBSCRIPTION  
OR  
RENEWAL

### FINCALC

A Complete Financial Analysis Package Used To Calculate Markup, Margin, Annuities, Compound Interest, Nominal And Effective Rates, Sinking Funds, Mortgage Calculations, Future Value, Savings and Insurance, Percentage Difference Between Two Numbers, Amortization Schedule and More .....

SEND FOR OUR NEW 64 PAGE SOFTWARE CATALOG (INCLUDING LISTINGS OF HUNDREDS OF TRS-80™ PROGRAMS AVAILABLE ON CASSETTE AND DISKETTE). \$2.00 OR FREE WITH EACH SUBSCRIPTIONS OR SAMPLE ISSUE

\* All programs are supplied on cassette (add \$3 for Diskette Version - add \$5 for modified Mod-II Version).

## COMPUTRONICS

MATHEMATICAL APPLICATIONS SERVICE

50 N. PASCACK ROAD  
SPRING VALLEY, NEW YORK 10977

ONE YEAR SUBSCRIPTION \$24 .....

TWO YEAR SUBSCRIPTION \$48 .....

SAMPLE OF LATEST ISSUE \$ 4 .....

START MY SUBSCRIPTION WITH ISSUE .....

(#1 - July 1978 • #12 - June 1979 • #24 - July 1980 • #30 - January 1981)

NEW SUBSCRIPTION..... RENEWAL.....

NEW TOLL-FREE  
ORDER LINE

(OUTSIDE OF N.Y. STATE)

(800) 431-2818

**NEW!!!**  
**MOD-II NEWSLETTER**  
**\$18/year (or 12 issues)**



**24** HOUR  
ORDER  
LINE



**(914) 425-1535**

CREDIT CARD NUMBER \_\_\_\_\_ EXP. DATE \_\_\_\_\_

SIGNATURE \_\_\_\_\_ NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_ CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_

\*\*\* ADD \$12/YEAR (CANADA, MEXICO) - ADD \$24/YEAR AIR MAIL - OUTSIDE OF U.S.A., CANADA & MEXICO \*\*\*



capability, including inverse field blinking. The on-board editor is a screen editor, not a line editor. The computer has terminal software in ROM so that it can be used as a terminal for another computer. This terminal capability is accessed from N-BASIC using the command TERM(w,p,c,a), where w=word length, p=parity, c=clock drive ratio and a=auto line feed. Once in the terminal mode, the PC-8000 can communicate with other equipment through the RS-232C interface.

The PC-8000 disk-based system will operate under NEC's proprietary operating system, called NECDOS, or the CP/M operating system. The disk drives are double-density controlled and will allow the storage of 177K bytes of data per formatted 5¼-inch disk.

This computer complies with FCC regulations regarding radio frequency interference (rfi). The unit tested did interfere with a television near it and plugged into the same wall socket. This situation was remedied by moving the computer a short distance away from the television.

## N-BASIC

The BASIC chosen for the PC-8000 is a Microsoft, Inc., BASIC called N-BASIC. It's similar to other versions of Microsoft BASIC running on the Apple, Radio Shack and Commodore micros. It is a powerful BASIC, containing a variety of commands unique to the PC-8000. It permits the access of the machine-language level of the computer from BASIC, using PEEK and POKE, USR and VARPTR.

The Z-80A compatible processor running on a 4 MHz clock makes the execution of the PC-8000 N-BASIC commands as fast as on the Apple and TRS-80. This is a contrast to the Casio and Sharp computers, which were much slower. N-BASIC uses floating point arithmetic (integer division is also available, a feature that will save a few bytes of code), single-precision numbers to seven places and double-precision numbers to 17 digits.

## At the Top

From a hardware point of view, the PC-8000 is a solid, professional product. The system's best feature, however, may be its documentation and training materials. NEC has spared no expense to provide as much written information about the system as possible—with one exception.

As a former documentation technical writer, I'm impressed more than

most by good documentation. The PC-8000 documentation impressed me a great deal. It includes reference manuals for each individual piece of hardware except the monitor. There are separate reference cards summarizing the N-BASIC commands, plus a card cross-referencing N-BASIC commands with their equivalents in Apple, Radio Shack and Commodore versions of BASIC. The N-BASIC reference manual is complete, well-indexed, neatly organized and attractively printed. In addition to these manuals, there is a user's manual that presents a system overview.

There is one glaring omission, however. Except for instructions on how to format and to back up a disk, there is virtually no information on the NECDOS. There are seemingly no utilities for the system—or at least no mention is made of any.

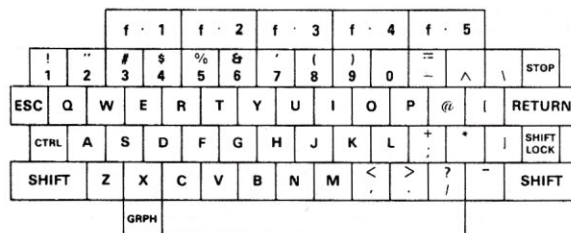
NEC apparently felt that all these materials were not enough, however. In addition to these manuals, there is a PC-8000 training program, a package that combines text with audio cassettes to teach the novice how to set the system up, turn it on and begin writing simple N-BASIC programs. There is an introduction to

computer math and instructions on disk and printer use. There are separate training programs for the two principal pieces of software that NEC has purchased to support the PC-8000.

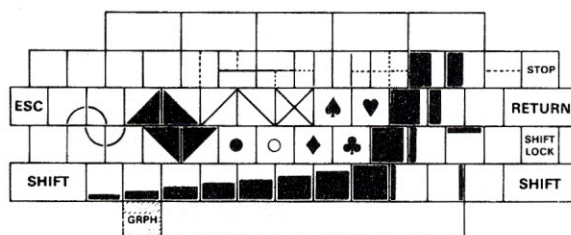
## Software Support

NEC has recognized the fundamental need for software support. The company has selected two software packages and tailored them for the PC-8000. These packages include the Benchmark Word Processing system and the Target Planner. The Benchmark package is a product of Metasoft Corporation and the Target Planner originates with Advanced Management Strategies, Inc. The Target Planner is a VisiCalc-type "what-if" business projection package. Both packages are high-quality software offerings, and NEC has enhanced them by customizing the manuals for the PC-8000. AMSI will produce the training program for the Target Planner.

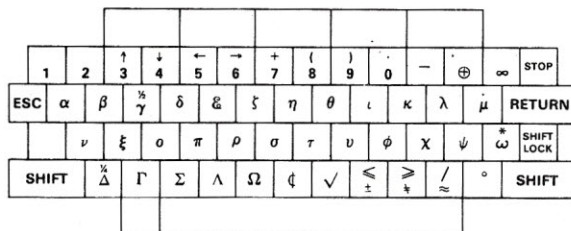
Since the PC-8000 operates under the CP/M operating system, the entire existing CP/M library of software will be immediately available to the PC-8000 user. This software will make the PC-8000 a serious contender in the small-computer marketplace. ■



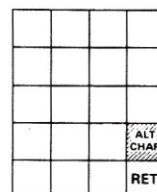
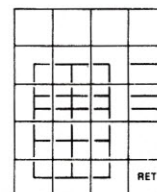
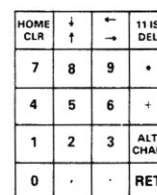
Standard keyboard.



Graphics characters.



Alternate character set.

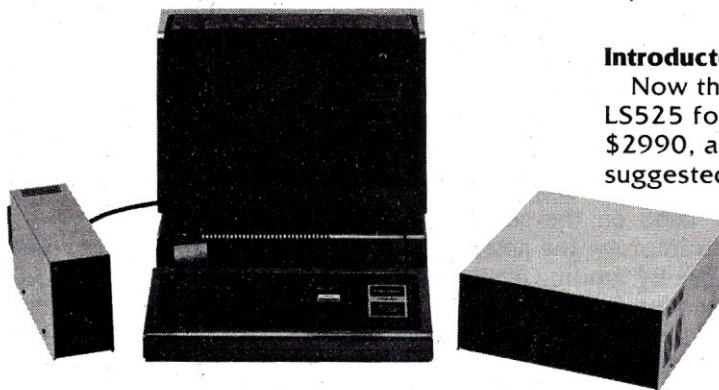




# THE NEW LAREDO LS525. WHEN YOU'RE READY TO GET DOWN TO BUSINESS.

**Laredo Systems, Inc.** introduces the LS525 five megabyte rigid disk memory system for TRS80 Models I and III. Laredo's LS525 rounds up a Seagate ST506 Drive, LDOS Operating System by Logical Systems, and Laredo's own LSI

- On-board data separator, micro-code diagnostics and write-precompensation.
- Increased disk media reliability and data integrity with automatic defect block allocation and extended ID fields.
- Versatile CPU compatibility provided by separate host adaptor.



## **Introductory Offer To TRS80 Users.**

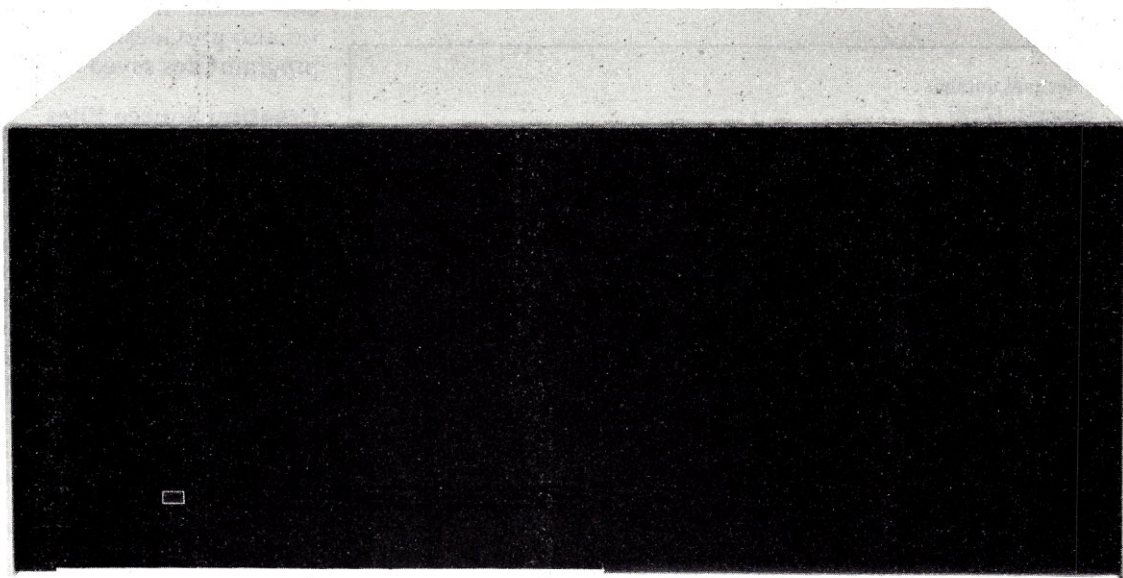
Now through October 1, 1981 buy the LS525 for the OEM/dealer price of \$2990, a savings of \$760 off the usual suggested retail price of \$3750.

LDOS Operating System with manual and diskette available for \$149.

500 Series Controller into a single-board controller that emulates the famed IBM 3370 disk system, complete with:

- Improved read/write/seek access time through full block buffering and variably tuned interleave.

For more information about the LS525 Memory System and the LSI 500 Series Controller, contact: **Laredo Systems, Inc.**  
**2264 Calle de Luna,**  
**Santa Clara, CA 95050**  
**(408) 980-1888**



**laredo systems inc.**

394



# A BASIC Assembler For the PET

By Robert Baker

**T**his simple yet powerful two-pass assembler for the Commodore PET directly generates loadable program disk files. It is written entirely in BASIC so it should run on all models. All disk commands are sent via the disk-command channel so the assembler will work with either DOS 1.0 (2040 disks) or DOS 2.x (4040 or 8050 disks). The programs require a Commodore Floppy Disk and at least 8K bytes of memory. A printer should be used to take full advantage of the features provided.

However, it is designed to be run on the 40-column screens and has not been upgraded for the newer

80-column machines.

Even though I wrote the assembler in BASIC, average assembly times are one to two seconds per line of source code on the second pass. I tried to improve the assembler performance by limiting available functions and by doing certain prechecking of fields with the Editor program when creating the source files. As such, this package must be used as designed for best results.

The major advantage of this assembler is that it can assemble any size program, since the source files are stored on disk. Also, since the output is actually a loadable program file,

the address range used is not restricted, as long as each program is one contiguous block.

## Editor

The Editor program (Listing 1) provides several basic functions for creating and maintaining source files for input to the Assembler program. Each function lets you have a printed copy of the source file being written or read. This program must be used when creating or editing files, since the Editor makes several checks to save running time of the Assembler program. Also, the Assembler expects to see the source lines in a specific format in the input file. The Editor also provides a means of printing program files saved on disk.

## Creating Source Files

The Create function produces an original source file from data entered at the keyboard. Each line of source code consists of from one to four fields: label, command, operand and comment. The label, operand and comment fields are optional but each line must have a command before it will be accepted by the Editor.

One exception to this is a full-line comment that starts with an asterisk (\*). The Editor will not allow entry of more than a given number of characters in each field, and any illegal characters will be ignored. A comma (,),

n	a decimal number example: 12369
\$n	a hexadecimal number with a dollar sign (\$) prefix example: \$A0F2
symbol	symbolic value, value of symbol specified example: TAG12
*	the current program counter value
char	ASCII literal, equals ASCII value of first character after the apostrophe (') example: 'S

Table 1. Instruction and assembler directive operands.

value or + value	positive value of operand
- value	Two's complement 16-bit value
value1 + value2	adds value2 to value1 enters 16-bit result
value1 - value2	subtracts value2 from value1 enters 16-bit result
value1/value2	divides value1 by value2 enters 16-bit result

Table 2.

Robert W. Baker (15 Windsor Drive, Atco, NJ 08004) authors Microcomputing's PET-pourri column.



colon (;) or quote (") cannot be used in any field due to PET handling of data files and these special characters.

Labels must start with a letter, but the remaining characters may be letters or numbers. A label cannot be longer than six characters in length. The command is either an instruction mnemonic with the appropriate address suffix or an assembler directive. The maximum length of this field is five characters. The operand field contains the instruction operand (if required), and must be 13 characters or less. See the Assembler description for more information on the format and syntax of the command and operand fields.

The comment field lets you include a 25-character comment in any line. Characters may be any alphanumeric or graphics character, except for the above-mentioned BASIC restrictions. For added convenience, you can enter a full-line comment of up to 50 characters instead of the regular four fields by typing an asterisk as the first character of the line.

Each source line will be displayed as two lines, with a blank line between them for a pointer. The current line number will be indicated as a prompt for input. The label, command and operand fields will be on the top line, with the comment on a separate line. A full-line comment will wrap from the top to the bottom line when exceeding the limit of the first line. An up-arrow pointer will indicate the current position on the line at all times when input can be accepted. If you select the print option, each line will be printed when it is written to the output file.

Once the Create function has been selected, the following controls are provided by the appropriate keys:

- The space bar moves the pointer to the first character position of the next field. A space typed in any comment field will be entered as a space character in that field and will have no other effect.
- A shift-space combination returns the pointer to the first character position of the current field. If the pointer is already at the first character position, it will step to the first character position of the previous field.
- The return key enters the current line if valid (i.e., a command is present or it is a full-line comment).
- A shift-return combination discards the current line, removes the line number from the line currently

## MICRO-80™ CASSETTES— 100% ERROR-FREE



	12	24
LENGTH	PACK	PACK
C-10.....	79¢	59¢
C-20.....	99¢	79¢

- Fully Guaranteed!
- World's Finest Media
- Premium 5-Screw Construction
- Used by Software Firms Nationwide
- Dealer and Club Discounts Available
- Custom Storage Case, Add 19¢ Each
- Shipping Charges, \$2.00 per pack

**MICRO-80™ INC.** ✓308  
K-2665 NO. BUSBY ROAD  
OAK HARBOR, WA 98277

## MEMOREX FLEXIBLE DISCS

BUY THE BEST FOR LESS. Lowest prices. **WE WILL NOT BE UNDERSOLD!!** Buy any quantity. Call free (800) 235-4137 for prices and information. Dealer inquiries invited and C.O.D.'s accepted.



**PACIFIC EXCHANGES**  
100 Foothill Blvd.  
San Luis Obispo, CA  
93401. In Cal. call  
(800)592-5935 or  
(805)543-1037

✓172

## Now with added words! \* ELECTRIC MOUTH



for S100, Elf II, Apple  
TRS-80, Level II\* From **\$99.95** kit

**Now — teach your computer to talk, increasing interaction between you and your machine.**

That's right: the ELECTRIC MOUTH actually lets your computer talk! Installed on-line in just minutes, it's ready for spoken-language use in office, business, industrial and commercial applications, and in games, special projects, R&D, education, security devices — there's no end to the ELECTRIC MOUTH's usefulness. Look at these features:

- Supplied with 143 letters/words/phonemes/numbers, capable of producing hundreds of words and phrases.
- Expandable on-board up to thousands of words and phrases with additional speech ROMs (see new speech ROM described below).
- Four models, that plug directly into S100, Apple, Elf II and TRS-80 Level II computers.
- Get ELECTRIC MOUTH to talk with either Basic or machine language (very easy to use, complete instructions with examples included).
- Uses National Semiconductor's "Digitaltalker."
- Includes on-board audio amplifier and speaker, with provisions for external speakers.
- Installs in just minutes.

**Principle of Operation:** The ELECTRIC MOUTH stores the digital equivalents of words in ROMs. When words, phrases and phonemes are desired, they simply are called for by your program and then synthesized into speech. The ELECTRIC MOUTH system requires none of your valuable memory space except for a few addresses if used in memory mapped mode. In most cases, output ports (user selectable) are used.

**SPOKEN MATERIAL INCLUDED (Vox I)**

one	eighteen	at	dollar	inches	number	ss	c	t
two	nineteen	cancel	down	is	of	second	d	u
three	twenty	case	equal	it	off	set	e	v
four	thirty	cent	error	kilo	on	space	f	w
five	forty	400hertz tone	feet	left	out	speed	g	x
six	fifty	80hertz tone	flow	less	over	star	h	y
seven	sixty	20ms silence	fuel	lesser	parenthesis	start	i	z
eight	seventy	40ms silence	gallon	limit	percent	stop		
nine	eighty	80ms silence	go	low	please	than	k	
ten	ninety	160ms silence	gram	lower	plus	the	l	
eleven	hundred	320ms silence	great	mark	point	time	m	
thousand	thousand	cent	greater	meter	pound	try	n	
thirteen	million	check	have	mile	pulses	up	o	
fourteen	zero	comma	high	milli	rate	volt	p	
fifteen	again	control	higher	minus	re	weight	q	
sixteen	ampere	hour	minute	ready	a		r	
seventeen	and	degree	in	near	right	a	s	

**ADDITIONAL VOCABULARY NOW AVAILABLE (VOX II)**

abort	complete	fifth	light	put	station
add	continue	fire	load	quarter	switch
adjust	copy	first	lock	range	system
alarm	correct	floor	longer	reached	temperature
alert	crease	fourth	more	receive	test
all	"de"	forward	move	record	"th"
ask	deposit	from	next	reverse	thank
assistance	dial	gas	no	repair	third
attention	door	get	normal	red	this
blue	east	going	north	repeat	turn
brake	"ed"	hale	not	replace	under
button	emergency	hale	notice	room	use
buy	enter	heat	open	safe	waiting
entry	hello	help	operator	second	warning
called	"er"	hurts	or	secure	was
caution	"eth"	hurts	pass	select	water
celsius	evacuate	hot	per	service	west
centigrade	exit	hold	press	side	wind
change	fail	in	pressure	slow	window
circuit	failure	incorrect	process	slower	yellow
cigar	fahrenheit	intruder	pull	smoke	yes
close	faster	key	push	zone	
cold		level			

\*Registered Trademarks

Continental U.S.A. Credit Card Buyers Outside Connecticut

### TO ORDER

Call Toll Free: 800-243-7428

To Order From Connecticut, or For Technical Assistance, call (203) 354-9375

**NETRONICS R&D LTD.**  
333 Litchfield Road, New Milford, CT 06776

Dept K8

Please send the items checked below:

- ☐ S100 "Electric Mouth" kit w/Vox I ..... \$ 99.95  
☐ Elf II "Electric Mouth" kit w/Vox I ..... \$ 99.95  
☐ Apple "Electric Mouth" kit w/Vox I ..... \$119.95  
☐ TRS-80 Level II "Electric Mouth" kit w/Vox I ..... \$119.95  
☐ VOX II (Second Word Set) ..... \$ 39.95

Add \$20.00 for wired tested units instead of kits. VOX II postage & insurance \$1.00, all others \$3.00 postage and insurance. Conn. res. add sales tax.

Total Enclosed \$

☐ Personal Check ☐ Cashier's Check/Money Order

☐ Visa ☐ Master Charge (Bank No. \_\_\_\_\_)

Acct. No. \_\_\_\_\_ Exp. Date \_\_\_\_\_

Signature \_\_\_\_\_

Print Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_ Zip \_\_\_\_\_



```

LOC  -OBJECT-  LINE  .....  SOURCE CODE  .....  < DASM V3.0 >

1  *
2  * SAMPLE ADDRESSING MODES
3  *
0000 6D 34 12      4      ADC  $1234      ABSOLUTE
0003 69 78      5      ADC# $5678      IMMEDIATE; TAKES LOW BYTE
0005 65 01      6      ADCZ  1      ZERO PAGE
0007 71 02      7      ADCBY  2      INDIRECT INDEXED; REG Y
0009 61 03      8      ADCBX  3      INDEXED INDIRECT; REG X
000B 75 04      9      ADCZX  4      ZERO PAGE INDEXED; REG X
000D B6 05     10      LDNZY  5      ZERO PAGE INDEXED; REG Y
000F 6C 06     11      JMPB  6      INDIRECT
0011 D8      12      CLD      IMPLIED...
0012 0A      13      ASLA      ACCUMULATOR
0013 F0 01     14      BEQ  **+1      RELATIVE
0015 7D CD AB   15      ADCX  $ABCD      ABSOLUTE INDEXED; REG X
0018 79 00 04   16      ADCY  1024      ABSOLUTE INDEXED; REG Y

17 *
18 * OPERANDS & EXPRESSIONS
19 *
20 TAG  =  'A      ASCII LITERAL
21 TAG2 =  'XVZ     ASCII LITERAL; 1ST CHAR
22 ABC  =  1+24     DEC+HEX'S
23 X2G  =  150/11   DIVISION
001E F0 04     24      BEQ  **+4      RELATIVE BRANCH
001D D0 F8     25      BNE  *-8      RELATIVE BRANCH
26 VVY  =  'B+128   ASCII LITERAL + DEC#
27 T2   =  -1        NEGATIVE NUMBER 2'S COMP
28 T3   =  T2-2      SUBTRACT
29 *
30 * ASSEMBLER ERRORS
31 *
32      XXX          BAD COMMAND/OPERAND
33      ASLX          BAD ADDRESSING MODE
**** INVALID...
001F 00 00     34      BEQ  **+200   INVALID BRANCHES...
**** INVALID...
0021 F0 00     35      BNE  *-200   INVALID BRANCHES...
**** INVALID...
0023 D0 00     36 TS    =  $XVZ     BAD OPERAND
**** INVALID...
37 TS    =  1000      DUPLICATE SYMBOL
38 TS    =  123       2ND DUPLICATE

```

SYMBOL	HEX--VALUE--DECIMAL	
ABC	0025	37
T2	FFFF	65535
T3	FFFF	65533
TAG	0041	65
TAG2	0058	88
TS	03E8	1000
*****	MULTIPLE DEFINITION	
X2G	000D	13
VVY	00C2	194
6 ERRORS		

Sample listing.

Listing 1. DASM-Editor in PET BASIC.

```

10 REM ***** DASM - EDITOR *****
20 REM *
30 REM * BY: ROBERT BAKER *
40 REM *
50 REM ***** V1.2 ***** 08/01/81 *****
60 :
70 :
80 PRINT "D";SPC(8);"D A S M  E D I T O R"
90 CLR:US$=""
100 B$=""
110 Q$(1)="CREATE":Q$(2)="EDIT":Q$(3)="COPY":Q$(4)="READ"
120 Q$(5)="PRINT":Q$(6)=Q$(5)
130 OPEN 15,8,15:CR$=CHR$(13):PRINT US$
140 PRINT "0 - 2 DONE":PRINT
150 PRINT "1 - 3 NEW SOURCE FILE":PRINT
160 PRINT "2 - 4 OLD SOURCE FILE"
170 PRINT "3 - 5 PRINT SPC(18);1"
180 PRINT "4 - 6 PRINT SPC(18);1"
190 PRINT "5 - 7 PRINT"
200 PRINT "6 - 8 LISTING FILE"
210 PRINT US$:PRINT "SELECT DESIRED FUNCTION: ";
220 GOSUB 2010:IF V$=V THEN PRINT "END"
230 IF A<1 OR F>6 THEN 220
240 GOSUB 2250:IF F>4 THEN GOSUB 2310
250 IF F>3 THEN 270
260 PRINT "DO YOU WANT A PRINTED COPY?":GOSUB 2630:IF A=89 THEN GOSUB 2310
270 ON F GOTO 310,1540,1810,2080,2080,1970
280 REM *****
290 REM CREATE NEW SOURCE FILE

```

More

displayed and allows restarting the line by displaying a new line prompt with the same line number.

- The clear/home key terminates the source file and discards the current line if anything has been typed but not entered with the return key.

- The cursor left/right key moves the pointer left or right within the bounds of the current field: The pointer cannot be moved past the existing characters in the field or the next space after the last character.

- The insert key lets you insert a character before the character being pointed to. Once the insert key has been pressed, a character must be typed and entered, or shift-return typed to discard the line. Insert cannot be used to exceed the maximum number of characters within a specific field.

- Pressing delete deletes the character currently pointed to.

Note that the cursor up/down and reverse keys are ignored.

## Editing Source Files

The Editor lets you edit a source file while copying it to a new output file. The Editor will keep a copy of the original source file as a backup copy, in case there are any system errors. If you pick the print option, each line written to the new file will also be printed. When the first line of the original source file is displayed, select the desired edit mode from those available. At the end of the original input file, you can add lines to the end of the file. When you're done editing a file, the number of lines in the new file will be indicated.

- When editing the file line-by-line, each line is displayed a line at a time and may be edited as desired. All control functions may be used as described for the create function with the following differences:

- The shift-return combination will delete the current line and display the next line.

- The clear/home key will display the current line and return to select another edit mode at that point.

- The insert-line(s)-before-the-current-line feature allows adding new lines of source code before the current line, exactly as when creating a new source file. When clear/home is typed, the current line will be displayed and you can select another edit mode as desired.

- Copy-from-one-line-to-another-line copies selected lines to the new file without change while each line is dis-



# Listing 1 continued.

```

300 REM =====
310 GOSUB 2320:FL$=FL$+".SRC"
320 OPEN 2,8,2,DR$+" "+FL$+".S.W":GOSUB 2440:IF EN THEN 2210
330 GOSUB 2250
340 N=1
350 L$="":C$=L$:O$=L$:T$=O$:GOSUB 2470
360 REM =====
370 REM LABEL FIELD
380 REM =====
390 PRINT:PRINT "T";TAB(7);:C=1
400 GOSUB 2660:IF C=1 AND A=42 THEN 1090
410 IF A=32 THEN 600
420 S$=L$:IF (A>64) AND (A<91) THEN 550
430 IF (C>1) AND (A>47) AND (A<58) THEN 550
440 IF A=160 OR B=17 THEN 390
450 IF B=13 OR B=19 THEN 1370
460 IF A=157 THEN GOSUB 2710
470 IF A=29 THEN GOSUB 2690
480 T=6:IF A=20 THEN GOSUB 2730:GOTO 560
490 IF (A<148) OR (LEN(L$)>5) THEN 400
500 GOSUB 2770
510 GOSUB 2660:IF A=141 OR B=19 THEN 1370
520 IF (A>64) AND (A<91) THEN 540
530 IF (C=1) OR (A<48) OR (A>59) THEN 510
540 GOSUB 2820:GOTO 560
550 IF C<7 THEN GOSUB 2540
560 L$=S$:GOTO 400
570 REM =====
580 REM COMMAND FIELD
590 REM =====
600 PRINT TAB(15);:C=1
610 GOSUB 2660:IF A=32 THEN 750
620 S$=C$:IF (A<32) AND (A<96) AND (C<6) THEN GOSUB 2540:GOTO 710
630 IF (B=17) OR (C=1 AND A=160) THEN 390
640 IF A=160 THEN PRINT:PRINT "T";:GOTO 110
650 IF B=13 OR B=19 THEN 1370
660 IF A=157 THEN GOSUB 2710
670 IF A=29 THEN GOSUB 2690
680 T=14:IF A=20 THEN GOSUB 2730:GOTO 710
690 IF (A<148) OR (LEN(C$)>4) THEN 610
700 GOSUB 2790:IF A=141 OR B=19 THEN 1370
710 C$=S$:GOTO 610
720 REM =====
730 REM OPERAND FIELD
740 REM =====
750 PRINT TAB(23);:C=1
760 GOSUB 2660:IF A=32 THEN PRINT:PRINT:GOTO 910
770 S$=O$:IF (A<32) AND (A<96) AND (C<14) THEN GOSUB 2540:GOTO 870
780 IF C=1 AND A=160 THEN PRINT:PRINT "T";:GOTO 600
790 IF A=160 THEN PRINT:PRINT "T";:GOTO 750
800 IF B=17 THEN 390
810 IF B=13 OR B=19 THEN 1370
820 IF A=157 THEN GOSUB 2710
830 IF A=29 THEN GOSUB 2690
840 T=22:IF A=20 THEN GOSUB 2730:GOTO 870
850 IF (A<148) OR (LEN(O$)>12) THEN 760
860 GOSUB 2790:IF A=141 OR B=19 THEN 1370
870 O$=S$:GOTO 760
880 REM =====
890 REM COMMENT FIELD
900 REM =====
910 PRINT TAB(7);:C=1
920 GOSUB 2660:IF C=1 AND A=160 THEN PRINT:PRINT "TT";:GOTO 750
930 IF A=160 THEN PRINT:PRINT "T";:GOTO 910
940 S$=T$:IF (B<31) AND (B<96) AND (C<26) THEN GOSUB 2540:GOTO 1050
950 IF B=17 THEN PRINT:PRINT "T";:GOTO 390
960 IF B=13 OR B=19 THEN 1380
970 IF A=157 THEN GOSUB 2710
980 IF A=29 THEN GOSUB 2690
990 T=6:IF A=20 THEN GOSUB 2730:GOTO 1050
1000 IF (A<148) OR (LEN(T$)>24) THEN 920
1010 GOSUB 2770
1020 GOSUB 2660:IF A=141 OR B=19 THEN 1380
1030 IF (B<32) OR (B>95) THEN 1020
1040 GOSUB 2820
1050 T$=S$:GOTO 920
1060 REM =====
1070 REM FULL LINE COMMENT
1080 REM =====
1090 IF L$+C$+O$+T$<>" " THEN 400
1100 L$=R$:PRINT R$;
1110 PRINT TAB(9);:C=1
1120 GOSUB 2660:S$=T$:IF (B<32) AND (B<96) OR A=32 THEN 1330
1130 IF B=13 OR B=19 THEN 1370
1140 IF A<157 THEN 1170
1150 IF C=32 THEN PRINT:PRINT "TTT":PRINT TAB(39);:C=C-1:GOTO 1120
1160 GOSUB 2710:GOTO 1120
1170 IF A=29 AND C<LEN(T$)+1 THEN GOSUB 2700:GOTO 1350
1180 IF A<160 AND B<17 THEN 1210
1190 PRINT:PRINT "T";:IF C>30 THEN PRINT "T";
1200 GOTO 1110
1210 IF (A<148) OR (LEN(T$)>49) THEN 1280
1220 IF C>31 THEN PRINT " ";MID$(T$,C):PRINT "T";TAB(C-23);:GOTO 1250
1230 PRINT " ";MID$(T$,C,31-C);TAB(70);" ":PRINT TAB(9);MID$(T$,31)
1240 PRINT "TTT";TAB(8-C);
1250 GOSUB 2660:IF A=141 OR B=19 THEN 1370
1260 IF (B<32) OR (B>95) THEN 1250
1270 S$=T$:GOSUB 2750:W$=MID$(T$,C):T$=S$+W$:GOSUB 2700:GOTO 1120
1280 IF (A<20) OR (C<LEN(T$)) THEN 1120
1290 IF C>31 THEN PRINT MID$(T$,C+1);" ":PRINT "T";TAB(C-23);:GOTO 1320
1300 PRINT MID$(T$,C+1,32-C);" ";TAB(70);" ":PRINT TAB(9);MID$(T$,33);" "
1310 PRINT "TTT";SPC(8-C);

```

More

played and possibly printed. If no number is entered and return is pressed, only the current line will be copied. By entering the keyword END, the input file will be copied to the end of the file.

●The delete-from-one-line-to-another-line mode is similar to the copy mode except it deletes the lines and displays the remaining lines.

## Copying Source Files

This function of the Editor copies existing source files unchanged. Each line is displayed, and possibly printed. Multiple files can be copied and concatenated into one new source file. At the end of each file copied, the total number of lines in the new file will be displayed.

## Reading and Printing Source Files

This function reads an existing source file and displays and/or prints each line as it is read. Hitting any key on the keyboard except clear/home or run/stop will alternately stop and start the function to let you hold various sections for closer examination. Hitting clear/home will terminate the function and return to the function menu after closing the input file. If you are not using a Commodore printer you may have to modify the print routines for them to function properly. If a printer is not used, just answer N for no when asked for a print option at the start of the Editor. In this way, all printing will be bypassed automatically.

## Printing Saved Listing Files

This function simply prints the saved listing file on the printer as read from the disk file.

## Assembler

The Assembler program (Listing 2) is a simple two-pass assembler that reads the source files generated by the Editor program and generates a standard PET program file on disk. It also provides a printed assembly listing complete with a symbol table that can optionally be saved onto disk for documentation purposes and so on.

On the first pass, the Assembler builds the symbol table while defining each label and computing its value. The symbols are displayed as they are defined to give you feedback on how the first pass is progressing. The symbol table is currently limited to 100 symbols. This limit may be changed by modifying the value of SZ in line 100. If the symbol table limit is



reached, or the amount of free memory space is less than 100 bytes, an error message will be displayed and the first pass will be ended.

If any I/O errors are encountered while reading the input files, an error message is displayed indicating the status code (ST) and/or disk error. Assembly will be terminated after reporting any fatal error of this type.

During the second pass, the source file is read again while the program file is written to disk. An assembly-language listing may also be printed or can be written to disk. The program file produced can then be loaded into the PET like any other program, since it uses the standard PET file formats. However, because of this, the program must be one contiguous block without any holes.

The printed listing produced by the Assembler will indicate the memory location and object in hexadecimal, the source file line number and the original line of source code consisting of label, command, operand and comment. The line number corresponds directly with the line numbers displayed by the Editor when editing the source file. Therefore, these numbers can be used to readily locate specific lines when editing from printed assembly or source file listings.

The Assembler expects the format of each line of code in the source file to contain four fields: an optional label, a mandatory command, an optional operand and a comment. Alternatively, a line may be a full-line comment if the first character of the line is an asterisk.

Labels can be one to six characters in length. The first character must be a letter while any remaining characters may be letters or numbers. The value of any label will be the address of the next byte of memory defined by the command or the value assigned to the label via an Assembler directive. All label values are computed as unsigned 16-bit values and maintained as such within the symbol table. If any label is multiply defined, the first definition will be used and all duplicate definitions will be indicated in the symbol table. These errors will also be included in the error count shown at the end of the assembly.

The command will consist of either an instruction mnemonic followed by the appropriate addressing suffix or one of the available Assembler directives. Instruction mnemonics are the standard mnemonics used by MOS Technology. To speed assembly

#### Listing 1 continued.

```

1320 S$=T$:R$=MID$(T$,C+1):GOSUB 2750:T$=S$:GOTO 1120
1330 IF C>50 THEN 1120
1340 GOSUB 2540
1350 IF C=32 THEN PRINT:PRINT SPC(9);
1360 T$=S$:GOTO 1120
1370 IF C<32 THEN PRINT:PRINT
1380 PRINT:PRINT:IF A=141 OR B=19 THEN 1410
1390 IF L$="*" OR C$="" THEN GOSUB 2380:GOSUB 2420:GOTO 1450
1400 PRINT"TTTT";GOTO 390
1410 PRINT"TTTT>>>XXXX":IF B<19 THEN 1450
1420 IF M THEN 1610
1430 C$="END":L$="":O$=L$:T$=O$:GOSUB 2430:IF M=0 THEN GOSUB 2680
1440 GOTO 2210
1450 IF M<1 THEN 1490
1460 GOSUB 2560:IF E THEN 1770
1470 GOSUB 2500:PRINT"TTTT":IF L$="*" THEN 1110
1480 GOTO 390
1490 IF A<141 THEN N=N+1
1500 GOTO 350
1510 REM =====
1520 REM EDIT FILE
1530 REM =====
1540 GOSUB 2320:E=0
1550 PRINT#15,"S"+DR$+" "+FL$+".BAK":INPUT#15,EN
1560 PRINT#15,"R"+DR$+" "+FL$+".BAK="+DR$+" "+FL$+".SRC"
1570 GOSUB 2440:IF EN THEN 2210
1580 OPEN 1,8,2,DR$+" "+FL$+".BAK,S,R":GOSUB 2440:IF EN THEN 2210
1590 OPEN 2,8,3,DR$+" "+FL$+".SRC,S,W":GOSUB 2440:IF EN THEN 2210
1600 GOSUB 2560:IF E THEN 1770
1610 M=0:GOSUB 2250:GOSUB 2490:PRINT U$:PRINT " 1 - EDIT LINE BY LINE":PRINT
1620 PRINT " 2 - INSERT LINE(S) BEFORE THIS LINE":PRINT
1630 PRINT " 3 - COPY FROM THIS LINE TO LINE#":PRINT
1640 PRINT " 4 - DELETE FROM THIS LINE TO LINE#":PRINT U$
1650 PRINT"SELECT DESIRED EDITING MODE: ";
1660 GOSUB 2610:M=V:IF V<1 OR V>4 THEN 1660
1670 GOSUB 2250:ON M GOTO 1470,340
1680 GOSUB 2500:PRINT U$:IF M=3 THEN PRINT"COPY";
1690 IF M=4 THEN PRINT"DELETE";
1700 PRINT" FROM THIS LINE TO .....":PRINT"(END = END OF INPUT FILE)":PRINT
1710 PRINT"LINE# ":N:PRINT"J":SPC(6);
1720 INPUT R$:L=VAL(R$):IF R$="END" THEN L=1E5
1730 GOSUB 2250:IF L<N THEN 1680
1740 IF M=3 THEN PRINT"COPY";
1750 IF M=4 THEN PRINT"DELETE";
1760 PRINT"ING LINE(S) .....":PRINT:PRINT:GOTO 1880
1770 GOSUB 2250:PRINT"END OF ORIGINAL INPUT FILE":GOSUB 2680
1780 PRINT"WANT TO ADD ADDITIONAL LINES";
1790 GOSUB 2630:M=0:IF A=78 THEN M=2:GOTO 1430
1800 N=Z+1:GOSUB 2250:GOTO 350
1810 PRINT:INPUT"NEW OUTPUT MODULE NAME ";FL$:IF FL$="" THEN 1810
1820 GOSUB 2350:OPEN 2,8,3,DR$+" "+FL$+".SRC,S,W":GOSUB 2440:IF EN THEN 2210
1830 GOSUB 2250:E=0:N=0
1840 PRINT:INPUT"INPUT MODULE NAME ";FL$:IF FL$="" THEN 1840
1850 GOSUB 2350:OPEN 1,8,2,DR$+" "+FL$+".SRC,S,R":GOSUB 2440:IF EN THEN 2210
1860 GOSUB 2250:PRINT"COPYING FILE.....":PRINT:PRINT
1870 GOSUB 2560:IF E THEN 1910
1880 IF M<4 THEN GOSUB 2380:GOSUB 2420
1890 IF M AND (N=L) THEN 1680
1900 GOTO 1870
1910 IF M THEN 1770
1920 CLOSE 1:GOSUB 2440:IF EN THEN 2210
1930 GOSUB 2680:PRINT"COPY ANOTHER FILE";
1940 GOSUB 2630:IF A=78 THEN GOSUB 2420:GOTO 2210
1950 GOTO 1830
1960 REM =====
1970 REM PRINT LISTING FILE
1980 REM =====
1990 GOSUB 2320:FL$=FL$+".LST"
2000 OPEN 1,8,4,DR$+" "+FL$+".S,R":GOSUB 2440:IF EN THEN 2210
2010 GOSUB 2250:PRINT:PRINT"PRINTING FILE.....":PRINT
2020 INPUT#1,L$:GOSUB 2440:IF EN<0 OR L$="END" THEN 2210
2030 IF LEFT$(L$,1)="" THEN L$=" "+MID$(L$,2)
2040 PRINT#4,L$:GOTO 2020
2050 REM =====
2060 REM READ FILE
2070 REM =====
2080 GOSUB 2320:FL$=FL$+".SRC"
2090 E=0:OPEN 1,8,2,DR$+" "+FL$+".S,R":GOSUB 2440:IF EN THEN 2210
2100 GOSUB 2250:IF F=5 THEN PRINT:PRINT"PRINTING FILE.....":PRINT
2110 GOSUB 2570:IF E THEN 2170
2120 IF F=4 THEN GOSUB 2500
2130 GOSUB 2380:GET R$:IF R$="" THEN 2110
2140 IF (ASC(R$) AND 127)=19 THEN PRINT U$:GOTO 2210
2150 GOSUB 2600:IF F=5 THEN 2100
2160 GOTO 2110
2170 IF F=4 THEN GOSUB 2600
2180 REM =====
2190 REM CLOSE ALL FILES AND RESTART
2200 REM =====
2210 CLOSE 1:CLOSE 2:CLOSE 4:CLOSE 15:GOTO 80
2220 REM =====
2230 REM ***** SUBROUTINES *****
2240 REM =====
2250 PRINT"J":Q$(F):IF M=0 THEN PRINT:GOTO 2300
2260 PRINT " - ":IF M=1 THEN PRINT"LINE BY LINE"
2270 IF M=2 THEN PRINT"INSERT"
2280 IF M=3 THEN PRINT"COPY"
2290 IF M=4 THEN PRINT"DELETE"
2300 PRINT U$:RETURN
2310 P=1:OPEN 4,4:RETURN
2320 PRINT:INPUT"MODULE NAME ";FL$
2330 IF FL$="" THEN 2320

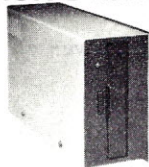
```

More



# WE WILL NOT BE UNDERSOLD

## DISK DRIVES



<b>FOR TRS-80* Model I</b>			
CCI-100	5 1/4", 40 Track (102K)	\$299	
<b>ADD-ON DRIVES FOR ZENITH Z-89</b>			
CCI-189	5 1/4", 40 Track (102K)	\$389	
Z-87	Dual 5 1/4" system	\$995	

External card edge and power supply included. 90 day warranty/one year on power supply.

<b>CORVUS</b>	5mg	\$3089	10mg	\$4489	Mirror	\$699
<b>RAW DRIVES</b>			8" SHUGART 801R			\$399
5 1/4" TANDON	\$ CALL		POWER SUPPLIES	\$ CALL		

## DISKETTES

<b>DISKETTES</b> — Box of 10				
5 1/4"	Maxell	\$40	BASF/Verbatim	\$26.95
8"	Maxell	\$45	BASF/Verbatim	\$36.00
<b>PLASTIC FILE BOX</b> —Holds 50 5 1/4" diskettes				
<b>PLASTIC LIBRARY CASE</b>		5 1/4" \$3.00	8"	\$ 4.00
<b>HEAD CLEANING DISKETTE</b>				\$25.00
<b>FLOPPY SAVER</b>		\$10.95	<b>RINGS</b>	\$ 6.95

## 16K RAM KITS

200ns for TRS-80*, Apple II, (specify):	2 for \$37	\$19
	Jumpers	\$2.50

## COMPUTERS/SYSTEMS

<b>ARCHIVES</b>	64K, 2-Drives, 77 Track	\$CALL
<b>ALTOS</b>	ACS8000 Series	\$CALL
<b>ZENITH</b>	48K, all-in-one computer	\$2200
<b>ATARI</b>	400 \$ 359 800 \$ 789	
<b>MATTEL</b>	INTELLIVISION	\$ 259
<b>APPLE PERIPHERALS</b>		
<b>SYSTEM SPECIAL</b>		

Apple II Plus 48K w/drive and controller. Epson MX-80 printer and interface. SUP-R Mod RF Modulator: List \$2965 You Pay \$2295

## TERMINALS

<b>ADDS</b>	Viewpoint	\$CALL
<b>ZENITH</b>	Z-19	\$ 725
<b>TELEVIDEO</b>	910 \$ 559 920C \$729 950	\$ 939
<b>IBM</b>	3101-10	\$1189

## S-100 CALIFORNIA COMPUTER SYSTEMS

<b>MAINFRAME</b>	\$359	<b>Z80 CPU</b>	\$ 269
<b>64K RAM</b>	\$599	<b>FLOPPY DISC CNTRL</b>	\$ 359
<b>INTEGRATED SYSTEM W/INTERNAL CABLES, TESTED</b>			
\$1975			
<b>2P + 2S I/O</b>			\$ 269
<b>4 PORT SERIAL I/O</b>			\$ 249
<b>4 PORT PARALLEL I/O</b>			\$ 179
<b>CABLES</b>			\$CALL

## CASIO CALCULATORS

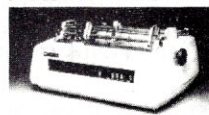
<b>POCKET COMPUTER</b>	FX702	\$199.00
<b>DESK PRINTER/CALCULATOR</b>	FR100	\$ 79.95
<b>SCIENTIFIC CALCULATOR</b>	FX8100	\$ 49.95
<b>GAME WATCH</b>	CA90 Plastic	\$ 49.95
<b>GAME WATCH</b>	CA901 Steel	\$ 69.95
<b>SPORT WATCH</b>	AX210 Calendar	\$ 59.95

## BUSINESS SOFTWARE

<b>WORDSTAR</b> for Apple II	\$ 329
<b>WORDSTAR</b> for Zenith Z89	\$ 329

For fast delivery, send certified checks, money orders or call to arrange direct bank wire transfers. Personal or company checks require two to three weeks to clear. All prices are **mail order only** and are subject to change without notice. **Call for shipping charges.**

## PRINTERS



<b>EPSON</b>	MX-70	MX-80	MX-80FT	MX100	\$CALL
--------------	-------	-------	---------	-------	--------

<b>PAPER TIGER</b>					
IDS 445	Graphics & 2K buffer				\$ 639
IDS 460	Graphics & 2K buffer				\$ 799
IDS 560	Graphics				\$1049

<b>ACCESSORIES</b>					\$CALL
<b>ANADIX</b>	DP-8000	\$849		DP-9500/01	\$1295

## OKIDATA

<b>Microline 80</b>	Friction & pin feed	\$CALL
<b>Microline 82</b>	Friction & pin feed	\$CALL
<b>Microline 83</b>	120 cps, uses up to 15" paper	\$CALL

<b>Call for new Microline series!</b>		
<b>CENTRONICS</b>	739, new model with graphics	\$ 739

## C. ITOH

<b>Starwriter I</b>	25 cps, parallel interface	\$1439
<b>Starwriter I</b>	25 cps, serial interface	\$1495
<b>Starwriter II</b>	45 cps, parallel interface	\$1770
<b>Starwriter II</b>	45 cps, serial interface	\$1870

<b>AXIOM</b>	GP-80M	\$ 319
--------------	--------	--------

<b>DATA SOUTH</b>	180 cps	\$CALL
-------------------	---------	--------

## MONITORS

<b>BELL &amp; HOWELL</b>	9" B & W BHD911	\$155
<b>LEEDEX</b>	12" B & W \$129 12" Green Screen	\$159

<b>SANYO</b>	13" Color \$329 9" B & W \$149 12" Green Screen	\$238
	12" B & W \$219 13" Color	\$399

<b>ZENITH</b>	13" Color \$349 12" Green Screen	\$129
---------------	----------------------------------	-------

## TELECOMMUNICATIONS

<b>LIVERMORE STAR MODEM</b>	2-year guarantee	\$125
<b>UNIVERSAL DATA SYSTEMS</b>	UDS103LP \$149 UDS103JP	\$215
<b>NOVATION</b>	CAT \$139 D-CAT	\$149
	AUTO-CAT \$199 APPLE CAT II	\$339
<b>D.C. HAYES</b>	SMART/STACK MODEM	\$235
	MICRO-MODEM II	\$295
<b>CCI Telnet Communications Package</b>		\$135

## APPLE ACCESSORIES AND SOFTWARE

Mfr. by: Microsoft - Mountain Computers - Videx - CCS - Personal Software			
<b>VISCALC</b>	\$185.00	<b>VISIDEX</b>	\$159.00
<b>VISITERM</b>	\$119.00	<b>VISILOT</b>	\$139.00
<b>Z-80 SOFTCARD</b>	\$259.00	<b>VIDEX BOARD</b>	\$249.00
<b>KEYBOARD ENHANCER</b>	\$110.00	<b>16K CARD</b>	\$159.00
<b>APPLE JOYSTICK</b>	\$ 49.00	<b>SUP-R FAN</b>	\$ 39.00
<b>SUP-R MOD</b>	\$ 25.00	<b>CCS CARDS</b>	\$ CALL
<b>APPLE CARDS</b>	\$ CALL	<b>ASCII EXPRESS</b>	\$ 59.00
<b>SUPERCALC</b>	\$199.00	<b>ALF9 VOICE BOARD</b>	\$149.00
<b>CPS MULTIFUNCTION CARD</b>			\$199.00

## ENTERTAINMENT

Mfr. by: On Line - Broderbund - Sirius - California Pacific			
<b>FLIGHT SIMULATOR</b>	\$29.00	<b>SARGON II</b>	\$29.00
<b>WIZARD &amp; PRINCESS</b>	\$28.00	<b>ABM</b>	\$21.95
<b>MYSTERY HOUSE</b>	\$24.00	<b>GORGON</b>	\$34.95
<b>HI-RES FOOTBALL</b>	\$35.00	<b>MICROPAINTER</b>	\$29.00
<b>RASTER PLASTER</b>	\$25.95	<b>APPLE PANIC</b>	\$27.95
<b>SPACE EGGS</b>	\$17.95	<b>MATTEL GAMES</b>	\$27.00

DEALER (NATIONAL/INTERNATIONAL) INQUIRIES INVITED

Send for **FREE Catalogue**

# The CPU SHOP

✓ 256

TO ORDER CALL TOLL FREE 1-800-343-6522

TWX: 710-348-1796 Massachusetts Residents call 617/242-3361

5 Dexter Row, Dept. K11M  
Charlestown, Massachusetts 02129  
Hours 10AM-6PM (EST) Mon.-Fri. (Sat. till 5)

Technical Information call 617/242-3361  
Massachusetts Residents add 5% Sales Tax  
Tandy Corporation Trademark® Digital Research





Listing 1 continued.

```

2340 FL$=LEFT$(FL$,12)
2350 PRINT:PRINT"DRIVE# 0 OR 1: ";
2360 GET DR$:IF DR$<>"0" AND DR$<>"1" THEN 2360
2370 PRINT DR$:RETURN
2380 IF P=0 THEN RETURN
2390 PRINT#4,SPC(6-LEN(STR$(N)));N:SPC(2);
2400 IF L$="*" THEN PRINT#4,"* ";T$:RETURN
2410 PRINT#4,L$:SPC(8-LEN(L$));C$:SPC(7-LEN(C$));O$:SPC(15-LEN(O$));T$:RETURN
2420 Z=Z+1
2430 PRINT#2,L$;",";C$;",";O$;",";T$:CR$;
2440 INPUT#15,EN$,EM$,ET$,ES$:EN=VAL(EN$):IF EN=0 THEN RETURN
2450 GOSUB 2250:PRINT"DISK ERROR!";PRINT EN$;",";EM$,ET$;",";ES$
2460 PRINT:PRINT:GOTO 2600
2470 V=4:IF M=2 THEN PRINT"V=";V:
2480 PRINT RIGHT$(" "+STR$(N),V);";";RETURN
2490 L=L1$:C=C1$:O=O1$:T=T1$:N=N1
2500 GOSUB 2470:PRINT TAB(7);L$;
2510 IF L$<>"*" THEN 2530
2520 PRINT " ";LEFT$(T$,31);TAB(50);" ":PRINT TAB(9);MID$(T$,32):PRINT:RETURN
2530 PRINT TAB(15);C$:TAB(23);O$:PRINT:PRINT TAB(7);T$:PRINT:RETURN
2540 IF C>LEN(C$) THEN S=S+R$:GOTO 2700
2550 M=MID$(S,C+1):GOSUB 2750:S=S+M$:GOTO 2700
2560 GOSUB 2570:N1=N:L1=L$:C1=C$:O1=O$:T1=T$:RETURN
2570 INPUT#1,L$:C$,O$,T$:GOSUB 2440
2580 IF C$="END" THEN E=1:RETURN
2590 N=N+1:RETURN
2600 PRINT"DEPRESS ANY KEY TO CONTINUE "
2610 GET R$:IF R$="" THEN 2610
2620 V=VAL(R$):A=ASC(R$):B=(A AND 127):RETURN
2630 PRINT " (Y/N): ";
2640 GOSUB 2610:IF A<89 AND A>78 THEN 2640
2650 PRINT R$:PRINT U$:RETURN
2660 PRINT"|||||";GOSUB 2610:PRINT "|||||";IF A=34 OR A=44 OR A=58 THEN 2660
2670 RETURN
2680 PRINT:PRINT"NEW FILE =";Z:"LINES":PRINT U$:RETURN
2690 IF C>LEN(S$) THEN RETURN
2700 C=C+1:PRINT R$:RETURN
2710 IF C>1 THEN C=C-1:PRINT R$;
2720 RETURN
2730 IF C>LEN(S$) THEN RETURN
2740 R=MID$(S,C+1):PRINT R$;" ":PRINT"J";TAB(T+C);
2750 IF C>1 THEN S=LEFT$(S,C-1)+R$:RETURN
2760 S=R$:RETURN
2770 M=MID$(S,C):PRINT " ";M$;
2780 PRINT:PRINT"J";TAB(T+C):RETURN
2790 GOSUB 2770
2800 GOSUB 2660:IF A=141 OR B=19 THEN RETURN
2810 IF (A<33) OR (A>95) THEN 2800
2820 GOSUB 2750:S=S+M$:GOTO 2700

```

Listing 2. DASM-Assembler in PET BASIC.

```

10 REM ***** DASM - ASSEMBLER *****
20 REM *
30 REM * BY: ROBERT BAKER *
40 REM *
50 REM ***** V3.0 ***** 08/01/81 *****
60 :
70 :
80 PRINT"J"SPC(6)"D A S M A S S E M B L E R"PRINT:PRINT:PRINT
90 CLR:CR$=CHR$(13)
100 SZ=100:DIM S$(SZ),V(SZ)
110 PRINT:INPUT"MODULE NAME ";FL$
120 IF FL$="" THEN 110
130 PRINT:PRINT"DRIVE# 0 OR 1: ";
140 GET DR$:IF DR$<>"0" AND DR$<>"1" THEN 140
150 PRINT DR$:FL$=LEFT$(FL$,12):OPEN 15,8,15
160 PRINT#15,"S"+" "+FL$:INPUT#15,EN
170 GOSUB 1490
180 OPEN 2,8,3,DR$+" "+FL$+"",P,W":GOSUB 1510
190 PRINT:PRINT"LISTING TO DISK (D) OR PRINTER (P): ";
200 GET PR$:IF PR$<>"D" AND PR$<>"P" THEN 200
210 PRINT PR$:IF PR$="P" THEN OPEN 4,4,LE$=CHR$(13)+CHR$(10):LS$="" :GOTO 270
220 PRINT#15,"S"+DR$+" "+FL$+"",LST":INPUT#15,EN
230 OPEN 4,8,4,DR$+" "+FL$+"",LST,S,W":GOSUB 1510:LE$=CHR$(13):LS$=""
240 REM =====
250 REM FIRST PASS. GENERATE SYMBOL TABLE
260 REM =====
270 PRINT"FIRST PASS - DEFINING SYMBOLS":PRINT:PRINT
280 GOSUB 1500:IF L$<"A" THEN 350
290 PRINT L$;
300 IF S=SZ OR FRE(0)<100 THEN PRINT"SYMBOL TABLE OVERFLOW":GOTO 440
310 S=S+1:S$(S)=L$:IF C$<"=" THEN 340
320 GOSUB 1160:V(S)=N:IF N<0 THEN S=S-1
330 GOTO 280
340 V(S)=P
350 IF C$<"@" THEN GOSUB 1100:GOTO 280
360 IF C$<"*" THEN 410
370 IF P>0 THEN 280
380 GOSUB 1160:IF N > -1 THEN P=N
390 IF L$<" " THEN V(S)=P
400 GOTO 280
410 IF C$="BY" THEN P=P+1
420 IF C$="ADR" THEN P=P+2
430 IF C$<"END" THEN 280
440 CLOSE 1:GOSUB 1510:GOSUB 1490
450 REM =====

```

More

times, an addressing suffix is added to the mnemonic rather than being encoded into the operand. The following table lists the suffixes used for each addressing mode:

blank	Absolute, implied or relative
A	Accumulator
#	Immediate
@	Indirect
Z	Zero page
X	Absolute indexed—register X
Y	Absolute indexed—register Y
@X	Indexed indirect—register X
@Y	Indexed indirect—register Y
ZX	Zero page indexed—register X
ZY	Zero page indexed—register Y

Only four Assembler directives are available—mainly to keep the assembly times as short as possible. The functions include:

●.ADR *n*, which defines a two-byte address constant in standard address format; low-order eight bits, high-order eight bits.

●.BY *n*, which defines a one-byte constant of the value *n*. If *n* is greater than 255, then the byte will be the low-order eight bits (one byte) of the binary value specified.

●.LABEL=*n*, which defines a symbolic label with the value *n*. A label must be specified and the value *n* must be previously defined in the first pass of the assembly.

●\*=*n*, which sets the program counter to the value specified, as a 16-bit quantity. If a label is specified, it will be assigned the same value as *n*, the first byte of the new area of memory. The value of *n* must be previously defined in the first pass. This command must be used prior to assembling any actual instructions, if it is to be used at all. This is because the program file being produced must be a contiguous block of code with a known starting address. The default address is zero if none is specified.

Instruction and Assembler directive operands may be specified in a number of formats, shown in Table 1. In addition, three operators are allowed within simple expressions using any of the above formats (decimal, hexadecimal, etc.) for each value in the expressions shown in Table 2.

All operands are computed as 16-bit quantities. If a command only requires an eight-bit quantity (such as a load accumulator immediate instruction), only the low order eight bits of the operand value will be used.

Comments in an instruction line may be up to 25 characters long, and



# Computerize your bookkeeping without terrifying your bookkeeper.

Introducing The Boss.™ the most advanced, yet most understandable, financial accounting system. Designed to automate your bookkeeping without confusion or mistakes.

Reference Number: 1000      Entry Date: 04-08-01  
 Transact Journal: CR      POST CASH RECEIPTS  
 Date Received: 04-08-01  
 Customer Check #: 1005  
 Customer ID #: 1001      XYZ COMPANY      0.00  
 Your Invoice #: 10222  
 Customer P.O. #: 000-111  
 Your Department #: 100  
 Your Category #: 100  
 Description: 1 Received Payment

DISTRIBUTION			
Account	Desc	Amount	Debit/Credit
100	Checking Account	1000.45	Debit
500	Cash Sales-Parts	1000.45	Credit
Account out of balance		0.00	

Typical screen format - actual photograph.

If "fear of the unknown" is standing between you and computerization, you should find out about The Boss.

The Boss system is immediately comprehensible to bookkeepers because it utilizes virtually the same format they're used to.

So even someone with no previous computer experience can easily learn and operate The Boss system.

**Features seldom found in packaged software.**

The Boss system is fully interactive, fully departmentalized and exceptionally fast. It can generate an astounding number of complex reports at the touch of a button.

General Ledger and Accounts Receivable and Payable transactions can be entered in any order in a single program.

Up-to-the-minute financial reports can be obtained without batch processing.

The Boss system computes financial ratio analysis.

It protects data from unauthorized personnel as well as computer malfunction.

And it has the largest programming and storage capacity of any micro system.

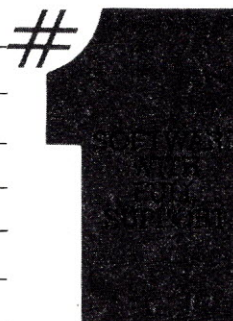
The Boss runs on most small business computers with CP/M® or similar operating systems. Its cost is only \$2,495.

**Get full support from Lifeboat.**

The Boss is brought to you exclusively and supported completely by Lifeboat Associates, world's largest computer software publisher. For more information about how you can profit from this extraordinary financial accounting system, send us the coupon below. Or call (212) 860-0300.

For more information on The Boss, mail coupon to Lifeboat Associates, 1651 Third Avenue, New York, NY 10028.

Name \_\_\_\_\_  
 Title \_\_\_\_\_  
 Company \_\_\_\_\_  
 Street \_\_\_\_\_  
 City \_\_\_\_\_  
 State \_\_\_\_\_  
 Zip \_\_\_\_\_



2411

Boss is a trademark of Balcones Computer Corp.  
 CP/M is a trademark of Digital Research, Inc.  
 Copyright © 1981, by Lifeboat Associates

Lifeboat Associates  
 1651 Third Ave.  
 New York, N.Y. 10028  
 Tel: (212) 860-0300  
 Telex: 640693 (LBSOFT NYK)  
 TWX: 710-581-2524

Lifeboat Inc.  
 OK Bldg., 5F  
 1-2-8, Shiba-Daimon  
 Minato-ku, Tokyo 105, Japan  
 Tel: 03-437-3901  
 Telex: 2423296 (LBJTJO)

Lifeboat Associates, Ltd.  
 PO Box 125  
 London WC2H 9LU, England  
 Tel: 01-836-9028  
 Telex: 893709 (LBSOFTG)

Lifeboat Associates GmbH  
 Hinterbergstrasse  
 Postfach 251  
 6330 Cham, Switzerland  
 Tel: 042-36-8686  
 Telex: 865265 (MICO CH)

Intersoft GmbH  
 Schlossgartenweg 5  
 D-8045 Ismaning, W. Germany  
 Tel: 089-966-444  
 Telex: 5213643 (ISOFTD)

Lifeboat Associates, SARL  
 10, Grande Rue Charles de Gaulle  
 92600 Asnieres, France  
 Tel: 1-733-08-04  
 Telex: 250303 (PUBLIC X PARIS)

**#1 Lifeboat Associates**  
 World's foremost software source

312



# Listing 2 continued.

```

460 REM SECOND PASS, GENERATE OBJECT
470 REM =====
480 PRINT "SECOND PASS - LISTING/OBJECT"
490 L=0:PS=0:P=0:EN=0:M$=""
500 PRINT#4,"LOC -OBJECT- LINE ";M$;M$;
510 PRINT#4," SOURCE CODE ";M$;M$;M$;" < DASM V3.0 >";LE$;
520 PRINT#4,LS$;" ";LE$;
530 E=0:B$="":GOSUB 1500:L=L+1:N$=STR$(L):IF L$="" THEN 560
540 IF L$="*" THEN PRINT#4,LS$;SPC(19-LEN(N$));N$;" *";T$;LE$;GOTO 530
550 IF C$ = "=" THEN 890
560 IF C$ > "@" THEN 670
570 IF C$ < "<" THEN 630
580 IF P#0 THEN E=E+4:GOTO 900
590 GOSUB 1160:IF N#0 THEN E=E+2: GOTO 900
600 P=N:PS=P
610 GOSUB 620:GOTO 770
620 P1=INT(PS/256):PRINT#2,CHR$(PS-(P1*256));CHR$(P1):PF=1:RETURN
630 PS=PS-P1:IF C$ = ".BY" THEN P=P+1:GOTO 730: REM <== 1-BYTE CONSTANT
640 IF C$ = ".ADR" THEN P=P+2: GOTO 730: REM <== 2-BYTE ADR CONSTANT
650 IF C$ = ".END" THEN 940
660 E=E+4: GOTO 900
670 PB=0:GOSUB 1100:I$=MID$(I$,5):IF PB=0 THEN E=E+4:GOTO 900
680 A$=LEFT$(A$," ",2)
690 IF LEFT$(I$,2)=A$ THEN 720
700 I$=MID$(I$,6):IF I$="" THEN 690
710 E=E+8:X1=PS:GOTO 1450
720 N=VAL(MID$(I$,3,3)):GOSUB 1460:B$=H2$+" ":IF PB=1 THEN 770
730 GOSUB 1160:IF N#0 THEN E=E+2:GOTO 1440
740 IF PB=2 THEN N=N-P:IF N>127 OR N < -128 THEN E=E+16:GOTO 1440
750 N1=INT(N/256):N2=N-(N1*256):GOSUB 1460:N=N2:GOSUB 1420:B$=B$+H2$+" "
760 IF P-PS=3 OR C$ = ".ADR" THEN N=N1:GOSUB 1420:B$=B$+H1$
770 N=PS:GOSUB 1460:PRINT#4,H$;
780 PRINT#4," ";B$;SPC(14-LEN(B$)-LEN(N$));N$;" ";L$;SPC(8-LEN(L$));C$;
790 PRINT#4,SPC(7-LEN(C$));0$;SPC(15-LEN(0$));T$;LE$;IF E=0 THEN 530
800 REM =====
810 REM FLAG ERRORS IN LISTING
820 REM =====
830 PRINT#4,"**** INVALID...";SPC(14);
840 IF (E AND 2) THEN PRINT#4,SPC(7);" - OPERAND";LE$;
850 IF (E AND 4) THEN PRINT#4," - COMMAND";LE$;
860 IF (E AND 8) THEN PRINT#4,SPC(3);" - ADR'NG MODE";LE$;
870 IF (E AND 16) THEN PRINT#4,SPC(7);" - BRANCH";LE$;
880 EN=EN+1:GOTO 530
890 GOSUB 1160:IF N#0 THEN E=E+2
900 PRINT#4,LS$;SPC(3);GOTO 780
910 REM =====
920 REM PRINT SYMBOL TABLE & ERROR SUMMARY
930 REM =====
940 IF S=0 THEN 1040
950 FOR X=1 TO 5:PRINT#4,LS$;" ";LE$;NEXT
960 PRINT#4,"SYMBOL HEX--VALUE--DECIMAL";LE$;PRINT#4,LS$" ";LE$;
970 B$="":S$(0)=""<:FOR E=1 TO S:P=0:FOR T=1 TO S:IF S$(T) < S$(P) THEN P=T
980 NEXT
990 IF B$<>S$(P) THEN 1010
1000 PRINT#4,"***** MULTIPLE DEFINITION";LE$;EN=EN+1:GOTO 1030
1010 N=V(P):O$=STR$(N):GOSUB 1460:B$=S$(P)
1020 PRINT#4,B$;SPC(11-LEN(B$));H$;SPC(14-LEN(O$));0$;LE$;
1030 S$(P)=""<:NEXT
1040 PRINT#4,LS$" ";LE$;PRINT#4,EN;" ERRORS";LE$;
1050 IF PR$="D" THEN PRINT#4,".END";LE$;
1060 PRINT "ASSEMBLY COMPLETE, ";EN;" ERRORS":GOTO 1550
1070 REM =====
1080 REM ***** NESTED SUBROUTINES *****
1090 REM =====
1100 M$=LEFT$(C$,3):A$=MID$(C$,4)
1110 RESTORE:FOR N=1 TO 56:READ I$:IF M$<>LEFT$(I$,3) THEN NEXT:RETURN
1120 PS=P:PB=VAL(MID$(I$,4,1)):IF A$="" THEN P=P+PB:RETURN
1130 P=P+2:IF A$="X" OR A$="Y" THEN P=P+1:RETURN
1140 IF A$="A" THEN P=P-1:PB=1
1150 RETURN
1160 M$=0$:FOR X=1 TO LEN(O$):I$=MID$(O$,X,1)
1170 IF I$="+" OR I$="-" OR I$="/" THEN 1190
1180 NEXT:GOSUB 1300:RETURN
1190 N=0:A$=MID$(M$,X+1)
1200 IF X>1 THEN O$=LEFT$(M$,X-1):GOSUB 1300:IF N#0 THEN 1290
1210 N1=N:O$=A$:GOSUB 1300:IF N#0 THEN 1290
1220 O$=M$:IF I$="+" THEN N2=N+N1
1230 IF I$="-" THEN N2=N1-N
1240 IF I$="/" THEN N2=INT(N1/N):IF LEFT$(M$,1)="/" THEN 1290
1250 N=N2
1260 IF N#0 THEN N=N+65536:GOTO 1260
1270 IF N#65535 THEN N=N-65536:GOTO 1270
1280 RETURN
1290 O$=M$:GOTO 1370
1300 IF O$ < "A" THEN 1330
1310 FOR X=0 TO S:IF S$(X)=O$ THEN N=V(X):RETURN
1320 NEXT:GOTO 1370
1330 IF LEFT$(O$,1)<>"$" THEN 1380
1340 N=0:FOR X=2 TO 6:H$=MID$(O$,X,1):IF H$="" THEN RETURN
1350 X1=VAL(H$):IF X1 OR H$="0" THEN N=N*16+X1:NEXT
1360 X1=ASC(H$):IF X1>64 AND X1<71 THEN N=N*16+(X1-55):NEXT
1370 N=-1:RETURN
1380 N=INT(VAL(O$)):IF N OR O$="0" THEN RETURN
1390 IF O$="*" THEN N=N-P:RETURN
1400 IF LEFT$(O$,1)="/" AND LEN(O$)>1 THEN N=ASC(MID$(O$,2)):RETURN
1410 GOTO 1370
1420 IF PF=0 THEN GOSUB 620
1430 PRINT#2,CHR$(N):RETURN
1440 IF C$>"@" THEN X1=PS+1
1450 N=0:FOR X=1 TO P-X1:B$=B$+"00 ":GOSUB 1420:NEXT:GOTO 770
1460 H$="":FOR X=3 TO 0 STEP -1:X1=INT(N/(16^X)):N=N-(X1*(16^X))
1470 IF X1>9 THEN X1=X1+7

```

any characters can be used (except as limited by the Editor due to handling of BASIC files with INPUT#). A full-line comment can be up to 50 characters long. Comment fields can contain graphics characters if desired.

Any assembly errors will be indicated in the printed assembly listing with an error line indicating the field in error. At the end of the assembly, the total number of errors will be indicated. Also, a sorted symbol table will be at the end of the assembly listing indicating the defined value of each symbol in both hexadecimal and decimal form for your convenience.

## Hints

The following are hints on effective use of the Editor/Assembler:

- Try to break up larger programs into smaller, logical pieces that can be assembled and tested separately. This allows quicker editing and assembling, when a program is repeatedly edited and assembled to correct bugs as they're detected.

- Define most commonly used symbols, constants and all working storage at the beginning of each program. Symbols and labels are entered into the symbol table in the order defined and searched sequentially in that same order for greatest assembler speed.

- Keep labels short to allow the maximum number of labels within the symbol table when writing larger programs.

- Watch the usage and length of comments as this can tremendously increase the read time of the source file during editing and assembling.

- Remember that line numbers in the printed assembly listing and source file listings correspond directly with the line numbers displayed by the editor when editing a source file. Therefore, they can be used to quickly locate a specific line when editing.

- The module name can be anything desired, with 12 characters maximum. A four-character suffix is automatically appended to identify the file type:

```

.SRC Source file
.BAK Backup source file automatically
      created when editing a source file
.LST Listing file saved to disk

```

The name of the final program file generated by the assembler will be the module name with no suffix.

If you want to avoid typing in the two programs shown, I'll send a copy of both on a 4040 diskette (DOS 2.1) for \$5 to cover my costs.■

More →



Listing 2 continued.

```

1480 H$=H$+CHR$(X1+48):NEXT H1$=LEFT$(H$,2):H2$=RIGHT$(H$,2):RETURN
1490 OPEN 1,8,2,DR$+":"+FL$+".SRC,S,R":GOTO 1510
1500 INPUT#1,L$,C$,O$,T$
1510 INPUT#15,EN$,EM$,ET$,ES$:IF EN$="00" THEN RETURN
1520 PRINT"DISK ERROR!":PRINT
1530 PRINT EN$;" ";EM$;ET$;" ";ES$
1540 PRINT:PRINT:PRINT"ASSEMBLY ABORTED":PRINT:PRINT
1550 CLOSE 1:CLOSE 2:CLOSE 4:CLOSE 15:END
1560 REM =====
1570 REM ***** INSTRUCTION DATA TABLE *****
1580 REM =====
1590 REM CONTAINS 56 ENTRIES, 1 PER INSTRUCTION
1600 REM EACH ENTRY CONSISTS OF:
1610 REM      3 CHARACTER MNEMONIC
1620 REM      1 DIGIT INSTRUCTION LENGTH
1630 REM      5 CHARACTER EXTENSIONS FOR EACH
1640 REM      VALID ADDRESSING MODE-
1650 REM      2 CHARACTER MNEMONIC SUFFIX
1660 REM      3 DIGIT OPCODE VALUE
1670 REM A NULL ENTRY IS INCLUDED AT THE END OF
1680 REM THE TABLE.
1690 REM =====
1700 DATA "ADC3# 105 1092 1010X0970Y1132X117X 125Y 121"
1710 DATA "AND3# 041 0452 0370X0330Y0492X053X 061Y 057"
1720 DATA "ASL3 0142 006A 0102X022X 030","BCC2 144","BCS2 176"
1730 DATA "BEQ2 240","BIT3 0442 036","BMI2 048","BNE2 208","BPL2 016"
1740 DATA "BRK1 000","BVC2 080","BVS2 112","CLC1 024","CLD1 216"
1750 DATA "CLI1 088","CLV1 184"
1760 DATA "CMP3# 201 2052 1970X1930Y2092X213X 221Y 217"
1770 DATA "CPX3# 224 2362 228","CPY3# 192 2042 196"
1780 DATA "DEC3 2062 1982X214X 222","DEX1 202","DEY1 136"
1790 DATA "EOR3#073 0772 0690X0650Y0812X085X 093Y 089"
1800 DATA "INC3 2382 2302X246X 254","INX1 232","INY1 200"
1810 DATA "JMP3 0760 108","JSR3 032"
1820 DATA "LDA3# 169 1732 1650X1610Y1772X181X 189Y 185"
1830 DATA "LDX3# 162 1742 166Y 1902Y182","LDY3# 160 1722 1642X180X 188"
1840 DATA "LSR3 0782 070A 0742X086X 094","NOP1 234"
1850 DATA "ORA3# 009 0132 0050X0010Y0172X021X 029Y 025","PHA1 072"
1860 DATA "PHP1 008","PLA1 104","PLP1 040","ROL3 0462 038A 0422X054X 062"
1870 DATA "ROR3 1102 102A 1062X118X 126","RTI1 064","RTS1 096"
1880 DATA "SBC3# 232 237A 2290X2250Y2412X245X 253Y 249","SEC1 056"
1890 DATA "SED1 248","SEI1 120","STB3 1412 1330X1290Y1452X149X 157Y 153"
1900 DATA "STX3 1422 1342Y150","STY3 1402 1322X148","TAX1 170"
1910 DATA "TAY1 168","TSX1 186","TXA1 138","TXS1 154","TYA1 152",""

```

# Happy Hands

Offers Discounts on All

## TRS-80<sup>TM</sup> COMPUTERS

We Have What You Are Looking For

- ☐ PROMPT SHIPPING
- ☐ AVAILABLE SERVICE CONTRACTS
- ☐ DISCOUNTED PRICES COMPARABLE TO ANY OTHERS
- ☐ NO TAX ON OUT OF STATE SHIPMENTS

Call Collect For Prices  
And Shipping Schedules

505-257-7865

or write

HAPPY HANDS ✓243

P.O. DRAWER I  
RUIDOSO, NEW MEXICO  
88345

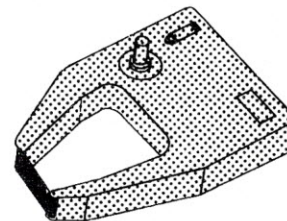
## DISCOUNT PRINTER RIBBONS

Brand New, Top Quality, Exact Replacement Ribbons & Cartridges. These Ribbons Produce Super Jet Black Impressions and Ultra Reliable Print Life. They Are Delivered to Your Door Promptly for Much Less Than Most Retail Stores

★SPECIAL! BUY 10 and GET ONE FREE!

YOUR PRINTER	PACK SIZE	RETAIL LIST**	YOUR WHOLESALE PRICE	SIZE	COMMENTS	CAT. ORDER#
ANADEx 9000 Series	1 pk	14.00 ea	14.00 (14.00 ea)	500'	Nylon Jet Blk	C-777
CENTRONICS 700-703, 737, 779	3/pk	18.95/3 pk	11.95/3 pk (3.98 ea)	563" x 45'	Nylon Jet Blk	C-700
CENTRONICS 100, 101A, 102, 103, 300, 301, 306, 308, 330, 358, 398, 500, 501, 503, 508, 588, 620, 820	3/pk	26.33/3 pk	17.55/3 pk (5.85 ea)	1" x 108"	Nylon Jet Blk	C-100
CENTRONICS 704-705	1/pk	16.95 ea	13.95/Giant Cart (13.95 ea)	5 16" x 210'	Giant Cart	C-7045
DEC 1/2 x 40YD	3/pk	17.77/3 pk	12.95/3 pk (4.32 ea)	1 2" x 120'	Double Spools	R-600
DEC 1/2 x 60YD	3/pk	20.12/3 pk	14.25/3 pk (4.75 ea)	1 2" x 180'	Double Spools	R-844
DIABLO HYTYPE II (M/S BLK) HI YIELD. FITS 70 PRINTERS!	1/pk	9.31 ea	6.87 ea (6.87 ea)	5 16" x 300,000 plus imp		C-511
EPSON MX70-80	1 pk	16.00 ea	13.95/Car (13.95 ea)	500' x 60'	Nylon Jet Blk	C-522
IBM - "SILVER DOLLAR" Sys. 34, Sys. 32 MDLA, Series IMDL4974, 5256, 3287, 3770, 3771-3774, 4974, 5100, 5103, 5110, 5228, 5256, 5320MDLA	5/pk	5.80 ea	14.90/5 pk (2.98 ea)	9 16" x 30'	Nylon Jet Blk	R-300
IBM - HARMONICA 1/2" SERIES I, MOD 4973/II, 3200, 3289, MOD 2	3/pk	9.42 ea	20.85/3 pk (6.95 ea)	1 2" x 108"	Nylon Jet Blk	C-350
NEC SPINWRITER	4/pk	23.40/3 cart	23.60/4 pk rb reload (5.90 ea)	1 2" x 51'	Nylon/Ex Lng Life	R-400
QUME (FITS 80 PRINTER MODES)	3/pk	18.00/3 pk	13.95/3 pk (4.65 ea)	1 4" x 310'	Multistrike Film	C-525
RADIO SHACK DAISY WHEEL II	1 pk	24.95 3pk	8.25 (8.25 ea)	250"	Mylar Multistrike	C-789
RADIO SHACK LP11, LPV	one, pk	13.95/cart	8.95/Reload rib. only (8.95 ea)	500" x 45'	Nylon Incl Instr	R-T3
RADIO SHACK LP11, LPV	3/pk	18.95/3 pk	11.95/3 pk (3.98 ea)	563" x 45'	Nylon Jet Blk	C-700
TELETYPE MOD 33, 28, 35, 37, 38, 88	10/pk	2.40 ea	13.90/10 pk (1.39 ea)	1 2" x 36'	Nylon Jet Blk	R-450
WANG M/S 5541W, WC 5581, WD 6581W, 2281W	1/pk	6.85 ea	5.95 ea (5.95 ea)	5 16" x 393'	Multistrike Film	C-550

40% OFF!! OR MORE!



### TERMS:

MINIMUM PURCHASE - \$20  
PAYMENT BY: C.O.D. (UPS), CHECK, MASTER CARD, OR VISA CHARGE CARD.

### VOLUME DISCOUNTS:

20 - 50 PACKS 10%  
51 - 100 PACKS 15%  
\*UNDER \$20, ADD \$5 HANDLING.  
\*\*APPROX. RETAIL. PRICE VARIES.

### ANCIE LABORATORIES ✓187

9204 Baltimore Blvd. 301-345-6000 (Wash. D.C. Local)  
College Park, MD 20740 301-792-2060 (Balt. MD Local)  
800-638-0987 (National)

NAME \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_

ANCIE Laboratories 301-345-6000 (Wash. D.C. Local)  
9204 Baltimore Blvd. 301-792-2060 (Balt. MD Local)  
College Park, MD 20740 800-638-0987 (National)

QTY CAT.# AMT.

TOTAL

- ☐ Check Enclosed
- ☐ C.O.D.
- ☐ VISA
- ☐ MASTER CHARGE
- ACCT. # \_\_\_\_\_
- EXP. DATE \_\_\_\_\_
- MIN. ORDER \$20
- PRICES SUBJECT TO CHANGE



# TRS-80 Printer for the PET

By Joseph W. Verzino

**T**he strongest feature of my TRS-80 system was its Quik Printer II. So when I sold the TRS-80 in favor of my PET 2001, I decided to keep the printer and interface it to the PET. Others might want to do the same, since the Quik Printer II is inexpensive—only \$187.

I chose to use the parallel (user) port, because it is the simplest. I rejected the IEEE-488 port because it requires opening and closing files, and because the IEEE-488 commands complicate the problem. And most people are probably already using their memory expansion port.

First, I added a reset button. Programs in the second cassette buffer (033A-3FF hexadecimal, 826-1023 decimal) are retained when the reset button is activated, so I placed the Print Screen program there. BASIC programs reside in higher memory starting at 0400 (hexadecimal), and are erased on reset. A BASIC program and this Print Screen program can reside in memory concurrently.

I tried to use handshaking on the CA1 line, but I couldn't get a response from the busy line of the printer. Consequently, I had to do data rate matching on the CB2 strobe line and operate without handshaking. However, operation without handshaking has proven to be reliable.

To copy a program, you must list it on the screen about 22 lines at a time and type SYS (826) in the command mode. The Print Screen program will change each 40-character line into

two 20-character lines, since the Quik Printer II only prints 32 characters per line.

The assembly listing of Print Screen (Listing 1) was obtained in this way. I first listed lines 826 through 870 on the screen, then used SYS(826) to have those lines printed out. This process was repeated for lines 872 through 907, 912 through 945 and 947 through 995. The program was being used to produce an assembly listing of itself. (Notice the change from one 40-character line to two 20-character lines for each line of the program.)

## The Print Screen Program

I used the TIM monitor to display a hex dump of part of the Print Screen program (i.e., a hexadecimal listing of the contents of memory locations 0338 to 03E0). I then used the Print

Screen program to list the hex dump on the Quik Printer II (see Listing 2). You can use the TIM monitor and load the Print Screen program by entering the hexadecimal values in Listing 2.

I used a program from *Micro* magazine ("A Simple 6502 Assembler for the PET" by Michael J. McCann, Aug.-Sept. 1978) to produce the assembled version of the Print Screen program, but I actually wrote the program directly in machine language. The assembled version is shown in Listing 1.

I used the PET 6522 versatile interface adapter (VIA), located from E840 (59456) to E84F (59471), to communicate with the Quik Printer. Output register A without handshaking, located at E84F (59471), contains the output logic. The peripheral-control register (PCR) at E84C (59468) gener-

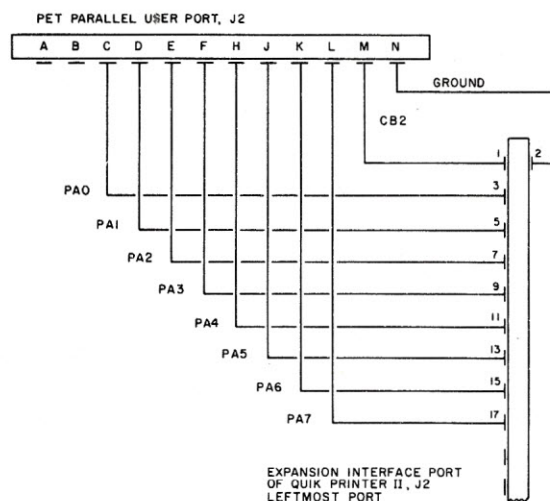


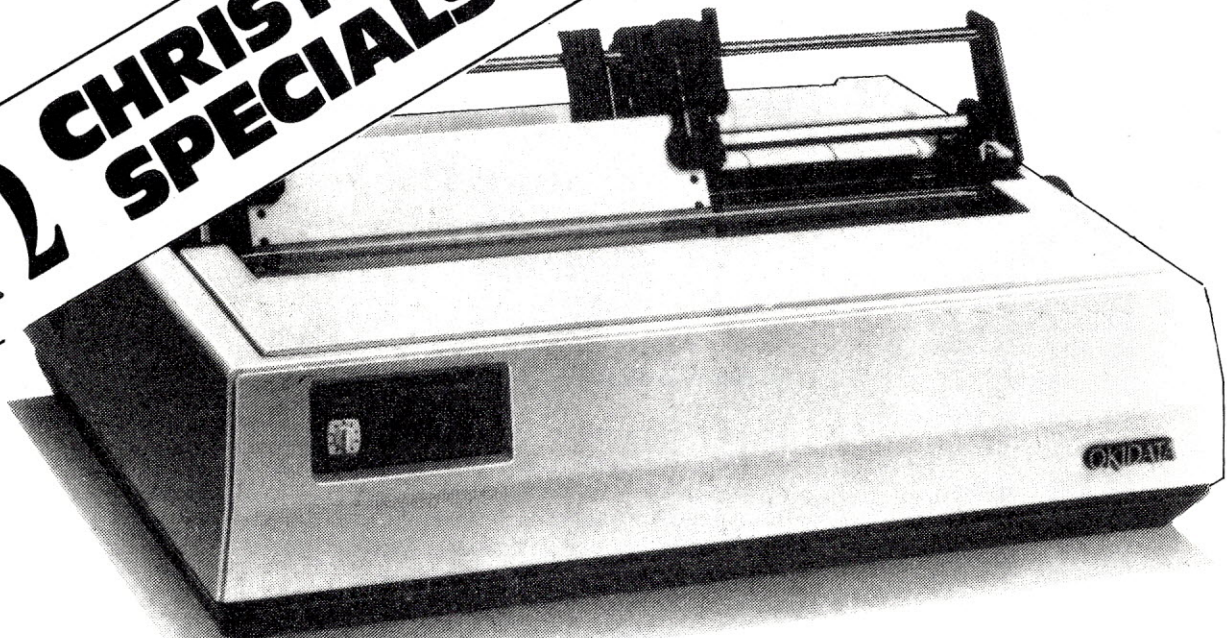
Fig. 1. Diagram of the ten connections that must be made from the parallel port of the PET to the expansion interface port of the Quik Printer II.



**OMEGA  
SALES CO.**

**EAST/WEST**

**CHRISTMAS  
SPECIALS!**



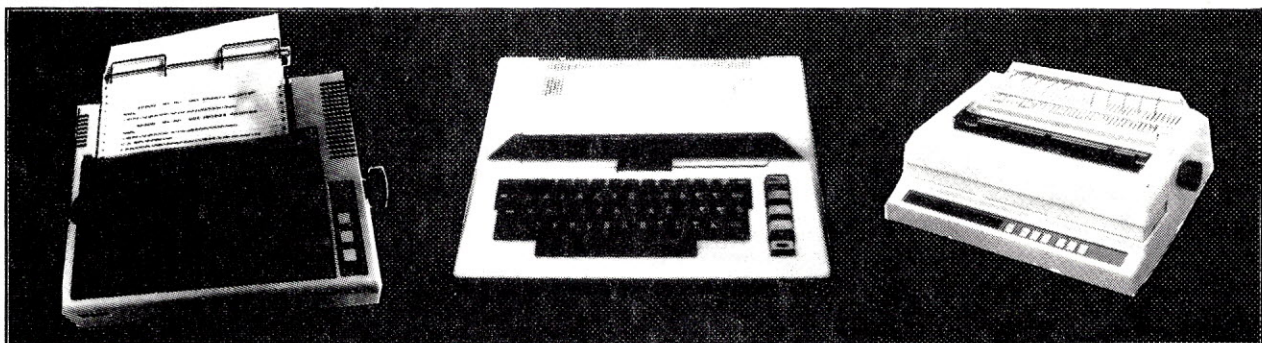
**OKIDATA MICROLINE-83A \$749**

OKIDATA MICROLINE-80 \$ 399  
OKIDATA MICROLINE-82 \$ 529  
OKIDATA MICROLINE-83 \$ 769  
DIABLO 630 \$1995  
**INTERTEC SUPERBRAIN 64K RAM \$2799**  
QD SUPERBRAIN \$2999  
**NEC 5510 SPINWRITER (7710) \$2345**  
NEC 5520 SPINWRITER (7720) \$2695  
NEC 5530 SPINWRITER (7730) \$2345  
NEC 12" MONITOR \$ 229

APPLE II PLUS 48K \$1139  
APPLE DISK w/3.3 DOS Controller \$ 525  
APPLE DISK w/o Controller \$ 449  
HAZELTINE 1420 \$ 799  
NORTHSTAR HORIZON II 32K QD \$2925  
ANADIX DP-9500/9501 \$1249  
**TELEVIDEO 912C \$ 669**  
TELEVIDEO 920C \$ 729  
TELEVIDEO 950 \$ 929

CBM 8032 COMPUTER \$1149  
CBM 8050 DISK DRIVE \$1349  
CBM 4032 COMPUTER \$1029  
CBM 4040 DISK DRIVE \$1029  
CBM 4022 \$ 649  
CBM VIC-20 \$ 269  
**LEEDEX/AMDEK 100 \$ 139**  
LEEDEX/AMDEK 100G \$ 169  
LEEDEX/AMDEK COLOR-1 13" Color Monitor \$ 329

**WE CARRY THE COMPLETE LINE OF ATARI SOFTWARE, PERIPHERALS AND ACCESSORIES.**



We Accept C.O.D.'s • Stock Shipments Same Day or Next • No Surcharge for Credit Cards • All Equipment Factory Fresh w/MFT Warranty • We carry the complete line of Personal Software.

**EAST COAST  
1-800-556-7586**

OMEGA SALES CO.  
12 Meeting St.  
Cumberland, RI 02864  
1-401-722-1027



**OMEGA SALES CO.**

**WEST COAST  
1-800-235-3581**

OMEGA SALES CO.  
3533 Old Conejo Rd. #102  
Newbury Park, CA 91320  
1-805-499-3678  
CA. TOLL FREE 1-800-322-1873



Listing 1. Assembly-language listing of the Print Screen program. This listing was produced by using the Print Screen program on itself. Notice that it changes 40-character lines to two 20-character lines.

```

826 033A A9 FF
LDAIM 255
828 033C 8D 43E9
STA 59459
831 033F A0 00
LDYIM 0
833 0341 AD 4CE8
LDA 59468
836 0344 09 E0
DRAIM 224
838 0346 8D 4CE8
STA 59468
841 0349 20 D103
JSR 945
844 034C A2 00
LDXIM 0
846 034E B9 0000
LDAY 32768
849 0351 20 7C03
JSR 892
852 0354 20 D003
JSR 976
855 0357 C8
INY
856 0358 98
TYA
857 0359 C9 00
CMPIM 0
859 035B D0 07
BNE 7
861 035D 20 9103
JSR 913
864 0360 C9 04
CMPIM 132
866 0362 F0 0C
BEQ 12
868 0364 E8
INX
869 0365 8A
TXA
870 0366 C9 14
CMPIM 20
872 0368 D0 E4
BNE 228
874 036A 20 D103
JSR 945
877 036D 4C 4C03
JMP 844
880 0370 A9 00
LDAIM 128
882 0372 8D 5003
STA 848

```

More →

ates CB2 pulsed strobe that is normally high, then pulsed low to print. In addition, I used the high-order byte of timer 2 at E849 (59465) in a fast-timer loop. The port A data-direction (PADD) register at E843 (59459) sets port A for output (FF).

Print Screen uses both the X and Y index registers as counters. Index

### Interfacing my PET to the Quik Printer required some modifications.

register X is used to count from 0 to 19 (20 counts) for a half line, and index register Y is used to count the four pages of memory from 8000 to 83FF (actually, 1024 counts). Since the Y register is a single byte, it will only count 0 to 255 (256 bytes, one page), and then roll back to 00. For walking through the screen memory, absolute indexed addressing is used, incrementing the Y register by one on each pass. The high address byte is incremented by 1 on each rollover of the Y register (from FF to 00).

Lines 826 and 828 set up port A for output. Line 831 initializes the Y index register to 0. Lines 833 to 838 set CB2 high. Line 841 jumps to the subroutine at line 945, which clears the printer buffer, outputs a carriage return and line feed, and sets up a one-half-second delay. Line 844 starts a new half-line by zeroing index register X. Line 846 loads the accumulator with a new character, absolute indexed on index register Y. It is the high address in this instruction (80) that is incremented on index register Y roll-over.

Line 849 calls a load output port subroutine at line 892. This subroutine converts PET screen codes to ASCII codes, adding decimal 64 to the letters for the conversion. Line 852 calls the print character subroutine, which supplies the timing and pulses the CB2 strobe line low. Lines 855 to 857 increment Y looking for Y register roll-over. With no roll-over (it only happens four times) the relative branch is to line 868. Lines 868 to 872 look for the end of half line (when index register X equals 20 decimal).

Out of 20 tries, 19 times the relative branch is back 28 locations to line

```

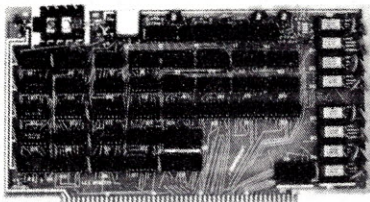
885 0375 8D 0303
STA 899
888 0378 8D 9003
STA 912
891 037B 60
RTS
892 037C C9 20
CMPIM 32
894 037E 10 07
BPL 7
896 0380 EA
NOP
897 0381 B9 0000
LDAY 32768
900 0384 18
CLC
901 0385 69 40
ADCIM 64
903 0387 8D 4FE8
STA 59471
906 038A 60
RTS
907 038B 00
BRK
912 0390 80 80
913 0391 AD 5003
LDA 848
916 0394 18
CLC
917 0395 69 01
ADCIM 1
919 0397 8D 8303
STA 899
922 039A 8D 5003
STA 848
925 039D 60
RTS
926 039E EA
NOP
927 039F EA
NOP
928 03A0 AD 49E8
LDA 59465
931 03A3 E9 E0
SBCIM 224
933 03A5 8D 9003
STA 912
936 03A8 AD 49E8
LDA 59465
939 03AB ED 9003
SBC 912
942 03AE 30 F8
BMI 240
944 03B0 60
RTS
945 03B1 A9 0D
LDAIM 13

```

More →



## Super Compuprism Color Graphics



For the S-100 Bus. 32K of on board memory allows a 288 H. x 192V. dot matrix, for a total of 55,296 pixels. Every pixel is programmable in any one of 16 colors or 16 grey levels completely independent of all other pixels in the matrix.

Compuprism Bare Board with documentation \$45, kit \$240, ass. and tested \$280. (16K Memory 144H. x 192V.)

Super Compuprism Bare Board with documentation \$50, kit \$350, ass. and tested \$395.

(32K Memory 288H. x 192V.)

Add \$15 to A & T price for 16 level grey scale. Add \$15 to A & T price for memory management port.

Compuprism software package, includes alphanumerics, point plot, line draw, and TRS-80\* graphics simulation \$20 or FREE with A & T unit.

ALL COD ORDERS SHIPPED WITHIN 72 HOURS. 4MHz MOD FOR S.D. SYSTEMS. EXPANDORAM \$10.

**J.E.S. GRAPHICS, P.O. Box 2752  
Tulsa, OK 74101, (918) 742-7104**

TRS-80\* is a trademark of Tandy Corp.  
SARGON II\*\* is a trademark of Hayden Book Co.

## Z-80 Users You Can Use TRS-80\* Software

We offer an assembled hardware interface which we guarantee will load data from TRS-80\* cassettes into any Z-80 based system. (Except sealed units.) The documentation explains how to patch the TRS-80\* software to your system. In fact you can virtually change your Z-80 machine into a TRS-80\* without making a single hardware change. The documentation also includes an example of patching SARGON II\*\* into a Z-80 system.

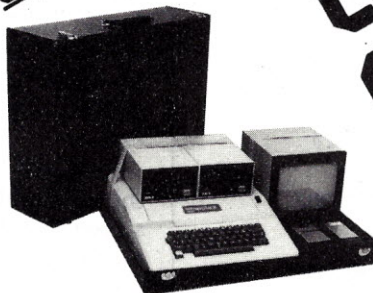
The price is \$30 or FREE with the purchase of an assembled compuprism or super compuprism unit.

### A-D, D-A Board

S-100 board provides 16 channels of analog to digital input and 8 channels of digital to analog output. With on board kluge area. Total cost of board and parts less than \$120. Bare board with documentation \$45.

computer  
case  
company

comp  
case



• AP103

- AP101 Apple II with Single Disk Drive ..... \$109
- AP102 Apple II with Double Disk Drives ..... 119
- AP103 Apple II, 9 inch Monitor & Double Drives ... 129
- AP104 Apple ///, two additional Drives & Silentyte 139
- AP105 12 inch monitor plus accessories ..... 99
- RS201 TRS-80 Model I, Expansion Unit & Drives.... 109
- RS202 TRS-80 Monitor or TV set ..... 84
- RS204 TRS-80 Model III ..... 129
- RS205 Radio Shack Color Computer ..... 89
- P401 Paper Tiger 440/445/460 ..... 99
- P402 Centronics 730/737 - Line Printer II/IV ..... 89
- P403 Epson MX70 or MX80 ..... 89
- CC90 Matching Attaché Case ..... 75

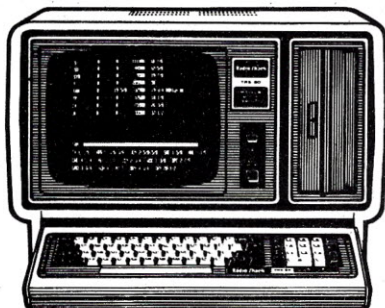
computer case company ✓ 320

5650 INDIAN. MOUND CT. COLUMBUS, OHIO 43213 (614) 868-9464



THE BIGGEST NAME IN LITTLE COMPUTERS™

**TRS-80™ Model II—Your Best Buy  
In a Business Microcomputer**



**UP  
TO  
15%  
OFF!  
on**

**TRS-80™ computers,  
software and peripherals**

Similar values on all merchandise

CALL COLLECT:

**915-283-2920** ✓ 214

**Van Horn Office Supply**

701 W. Broadway -- P O · Box 1060

Van Horn, Texas 79855

Dealer G055

Form F48 Provided

Standard Warranty on Merchandise

THE NATIONWIDE SUPERMARKET OF SOUND®



## DIABLO 1620 \$1895



- Letter quality daisywheel printer
- Upper and lower case
- Forms tractor, print wheel, ribbon included
- ASCII serial interface with RS-232 cable
- Bidirectional printing
- Completely refurbished by national terminal distributor with 30 day warranty

### PRINTERS

### VIDEO MONITORS

NEC 5510	\$2495	9" Sanyo B&W	\$169
NEC 5530	2495	12" Sanyo B&W	289
Diablo 630	2425	12" Sanyo w/green screen	299
Centronics 730	675	13" Sanyo Color	495
Centronics 737	799	9" Panasonic B&W	169
		9" RCA B&W	169



Verbatim

### DISKETTES

3M

5"SS,DD	10/2.40	50/2.35	5"SS,SD	10/2.80	50/2.70
5"DS,DD	10/3.95	50/3.90	8"SS,SD	10/2.90	50/2.80
5"SS,QD	10/2.90	50/2.85	8"SS,DD	10/3.50	50/3.40
8" SS, SD	10/3.05	50/3.00	8" DS, SD	10/4.50	50/4.40
8" SS, DD	10/3.35	50/3.30	8" DS, DD	10/4.50	50/4.40
8" DS, DD	10/4.15	50/4.10	Disk Flip 'N File Case 5"	22.95, 8"	27.95
Diskette Storage Pages 10/4.25			Disk Library Case 5"	2.05, 8"	2.80

### 3M HEAD CLEANING KIT

### PAPER & LABELS

• Eliminate downtime	Greenbar 14 1/2 x 11	
• Eliminate service calls	one part 3000 sheets	39.95
• Increase life of read-write heads	two part 1300 sheets	45.95
• Cleans in 30 seconds	White 9 1/2 x 11	
• Removes dust, dirt, magnetic oxides	one part 3500 sheets	29.95
	two part 1400 sheets	33.95
	Labels 3 1/2 x 1 1/8	
	one across box of 5000	17.30
	two across box of 10,000	34.60

5 1/4" or 8" **\$19.50**

### PRINT WHEELS

### RIBBONS

Mfr.	ea.	6+	Mfr.	ea.	Doz.
Diablo	8.25	7.50	Diablo	6.50	72.00
Qume	8.25	7.50	Qume	4.00	43.50
NEC	17.00	15.50	NEC	7.00	71.50

Call for quantity prices—Minimum \$1.75 shipping and handling. ✓ 63



**DAVIS SYSTEMS INC.**  
2184 Meadowcliff Drive N.E., Atlanta, GA. 30345  
(404) 634-2300





Listing 1 continued.

```

947 03B3 8D 4FE8
STA 59471
950 03B6 20 D003
JSR 976
953 03B9 AD 0202
LDA 514
956 03BC 69 20
ADCIM 32
958 03BE 8D 9003
STA 912
961 03C1 AD 0202
LDA 514
964 03C4 ED 9003
SBC 912
967 03C7 30 F8
BMI 248
969 03C9 60
RTS
970 03CA A0 03
LDYIM 3
972 03CC 20 A003
JSR 928
975 03CF 60
RTS
976 03D0 AD 4CE8
LDA 59468
979 03D3 29 AF
ANDIM 175
981 03D5 8D 4CE8
STA 59468
984 03D8 20 A003
JSR 928
987 03DB 09 E0
ORAIM 224
989 03DD 8D 4CE8
STA 59468
992 03E0 20 A003
JSR 928
995 03E3 60
RTS

```

846, loading the accumulator with the next character. On the 20th try, the program steps to line 874, which is a carriage return, line feed, one-half second delay. The program steps to line 877 and makes an unconditional jump to line 844, the start new half-line entry point. We return to the four roll-over conditions.

At line 861, only accessed at roll-over of index register Y, the program jumps to a subroutine at line 913, the increment page subroutine. This subroutine adds 1 to the high address byte at addresses 0350 (848) and 0383 (899), and leaves a copy of the high

address byte in the accumulator. At line 864 the high address byte is compared to 84 hexadecimal. The first three times (81, 82 and 83), the program drops to line 868, again looking for the end of a half-line. On the fourth roll-over, the equality comes true in line 866, and the program branches forward 12 locations to line 880, and it's cleanup time before the exit.

Line 880 loads hexadecimal 80 in the accumulator. This value is then stored in 0350 (848) and 0383 (899) to reset the pointer to the start-of-screen. This value is also stored at 0390 (912), which is a temporary store location used to store samples of the two timers.

As a consequence of executing the cleanup routine (lines 880 to 888) before the return, the Print Screen program is identical before and after each execution of a SYS (826). This aids in the verification process when storing the program on tape. Lastly, line 906 is a return-from-subroutine RTS instruction, for branching control back to the calling program. It is this RTS instruction that lets you embed the SYS (826) statement in BASIC programs without losing continuity in the calling BASIC program (see Listing 2).

### The Simple Connections

To communicate with the Quik Printer II, ten wires must be connected from the parallel port on the PET to the expansion interface port on the Quik Printer II. The ten wires carry the digital ground, CB2 (strobe line) and eight parallel data line (PA0 to PA7) signals (see Fig. 1).

Looking at the rear of the Quik Printer II, the left-most vertical port is the expansion interface port. The top-left contact is the no. 1 contact, and the top-right contact is the no. 2 contact. The contacts in the left column are consecutively odd as you go down the column; nos. 3 through 17 odd are the parallel data lines, with pin 3 being the PA0 line (the least significant digit), and pin 17 being PA7 (the most significant digit). Correspondingly on the PET, pin C is the LSD and PIN L is the MSD.

On the PET, the bottom contacts are used. The PET connector is a 12-position, 24-contact connector with 0.156-inch centers between contacts. The connector vendors are mentioned in the PET manuals. The Quik Printer II connector is a 17-position, 34-contact connector with a 0.1-inch spacing between contact

centers. I used a manual wire-wrap tool to make these connections.

If you don't want to enter the program in machine language using the TIM monitor, I will send you a tape of it for \$5. To produce the tape I used a monitor program (see "PET Mini Monitor" by William H. Perdue, Oct. 1980, *Microcomputing*, p. 88) located at 133A (4922) to copy the machine-language program to tape. ■

```

.: 0338 20 20 A9 FF
8D 43 E8 A0
.: 0340 00 AD 4C E8
09 E0 8D 4C
.: 0348 E8 20 B1 03
A2 00 B9 00
.: 0350 80 20 7C 03
20 D0 03 C8
.: 0358 90 C9 00 D0
07 20 91 03
.: 0360 C9 84 F0 0C
E8 8A C9 14
.: 0368 D0 E4 20 B1
03 4C 4C 03
.: 0370 A9 00 8D 50
03 8D 03 03
.: 0378 8D 90 03 60
C9 20 10 07
.: 0380 EA B9 00 80
10 69 40 8D
.: 0388 4F E8 60 00
00 18 69 40
.: 0390 00 AD 50 03
10 69 01 8D
.: 0398 03 03 0D 50
03 60 EA EA
.: 03A0 AD 49 E8 E9
E0 8D 90 03
.: 03A8 AD 49 E8 ED
90 03 30 F8
.: 03B0 60 A9 0D 8D
4F E8 20 D0
.: 03B8 03 AD 02 02
69 20 8D 90
.: 03C0 03 AD 02 02
ED 90 03 30
.: 03C8 F8 60 A0 03
20 A0 03 60
.: 03D0 AD 4C E8 29
AF 8D 4C E8
.: 03D8 20 A0 03 09
E0 8D 4C E8
.: 03E0 20 A0 03 60
7E A0 F3 84

```

Listing 2. Hex dump of the Print Screen program.



SAVE  
\$\$\$

# TRS-80<sup>®</sup>

## MICROCOMPUTERS

CALL US...  
SAVE MONEY

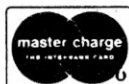


Model II  
64K  
\$3325.00  
Full 3  
Month  
Warranty

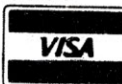
CALL COLLECT:  
512 - 689-5536

Master Electronics, Inc. ✓72

154 N. 5th, Raymondville, Tx. 78580



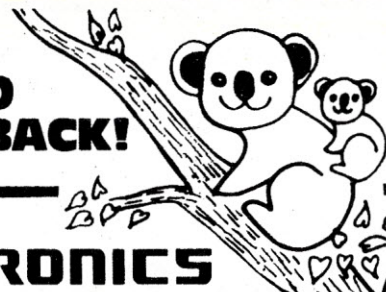
Form F48 Provided  
Standard Warranty On Merchandise



Authorized TRS-80 Dealer, Store #F-723

SAVE  
\$\$\$

GO  
PIGGYBACK!



# CENTRONICS

**ADD lowercase with our  
PLUG-IN piggyback board!**

9WX7H Dot Matrix \$135  
5WX7H Dot Matrix \$ 95

TWO complete character sets on board:

96 character ASCII **PLUS** choice of  
128 character APL, TRS-80/H-19 Graphics or  
Scientific. (Customer defined: add \$50/set).

**Most printers convertible: specify logic board #**



**SYDNEY SEZ:**  
Shop Comparatively!

# DSE

Digital Systems Engineering

12503 King's Lake Drive, Reston VA 22091 (703) 620-2994

**ALSO AVAILABLE:** New Centronics and Integral Data Systems printers at  
15-20% below list; also, used printers of several makes. **Call for information!**

MasterCard, VISA, Check, MO, PO

All products warranted 90 days

**PACIFIC**  
OFFICE  
SYSTEMS

COMPUTER INTERFACES  
& PERIPHERALS

### \*ANNOUNCING: POS 800/1600 UNIVERSAL TAPE DRIVE CONTROLLER\*

This "black box" controller/formatter is designed as a standalone interface between industry-standard NRZ1 (800 BPI) and PE (1600 BPI) tape drives and a parallel or RS-232 serial port of an 8-bit ASCII computer. Serial interface emulates a terminal vis-a-vis your system software; parallel interface emulates a reader/punch and responds to CPM-style PIP commands from your computer. Tape speeds 12.5, 25 and 37.5 ips. Interface is microprocessor-controlled, includes power supply and 4K or 16K buffer memory. Prices and details available upon request.

- **POS-100 NRZ1 TAPE DRIVE CONTROLLER/FORMATTER** — Now your micro can read and write IBM/ANSI compatible NRZ1 format 9-track magnetic tapes. The POS-100 consists of S-100 bus card, 6' ribbon cable, tape drive controller card, cable to Perlec-Standard NRZ1 Tape drive, plus documentation and Z-80 or 8080 software (specify). Power is derived from tape drive and S-100 bus. Ship wt.: 10 lbs. Suggested Retail Price . . . . . \$995.00
- **POS DAISY-WHEEL PRINTER INTERFACE for TRS-80** — Will drive Diablo HyType I, HyType II, and Qume Q and Sprint 3 printers. Includes 1K user-available memory for custom print routines (such as graphics, bidirectional printing, etc.). Programmed to respond to print commands from BASIC ELECTRIC PENCIL™ and SCRIPSIT™ software. Draws its power from printer. Ship wt.: 5 lbs. Price . . . . . \$250.00  
Cables, each (Specify HyType I, HyType II, or Qume) . . . . . \$ 25.00
- **POS ASCII INTERFACE for IBM I/O SELECTRIC** — This Centronics-style parallel printer interface will drive an IBM Model 731 or 735 I/O typewriter (EBCD and Correspondence codes). No software needed. Features on-board EPROM which holds up to 8 ASCII-to-IBM code tables for different type spheres. Closed-loop operation runs at maximum printer speed; stops and starts on a single character without loss of data. Requires +12VDC and +5VDC power source. Ship wt.: 5 lbs. Price . . . . . \$249.95  
Power Supply (+5VDC, +12VDC, +24VDC for Solenoids on Printer) . . . \$ 49.95
- **CONVERT OFFICE ELECTRIC TO I/O TYPEWRITER** — Kit includes assembled solenoids, switches, wire harness, magnet driver PCB plus instructions for installation and mCPU interface. Price . . . . . \$150.00
- **"FORMALINER" Variable Width Forms Tractor for 15" Selectrics** . . . \$95.00
- **GTE Model 560 ASCII ELECTRIC I/O Terminal** — With RS-232 Serial Interface and digital cassette deck for use as memory typewriter. Ship wt.: 100 lbs. Price, tested and adjusted . . . . . \$1,195.00
- **POS ASCII IBM SELECTRIC PRINTER** — 15" Selectric from GTE terminal cleaned and adjusted with POS Centronics-style ASCII printer interface, UC/LC, carbon and fabric ribbons. Compatible with TRS-80, Apple, SOL and other CPU parallel printer ports. Ship wt.: 75 lbs. Price . . . . . \$895.00

PACIFIC OFFICE SYSTEMS ✓153

2265 Old Middlefield Way • Mountain View, CA 94043 • (415) 493-7455

SPECIAL FROM  
STANDARD SOFTWARE!

**\$150  
CREDIT  
TOWARDS PURCHASE OF  
XEROX SOFTWARE!**

# XEROX

820 COMPUTER

# \$2995

NOT INCLUDING SOFTWARE

**A SIMPLY AMAZING  
MACHINE  
AT A SIMPLY AMAZING  
PRICE!**

The Xerox 820 is more than just a word processor. And it's more than just a desktop computer. Because this multi-function machine is both!

As an *inexpensive word processor*, the 820 allows you to upgrade existing office typewriters and non-display text editors. Now you can have WP capabilities without paying for equipment with more features than you really need.

As a *desktop computer*, the 820 gives you a cost-effective way to automate your daily work routine through a wide range of software options. Xerox will offer applications software to cover many uses... and the CP/M<sup>®</sup> operating system available on the 820 opens the door for use of thousands of software packages available from STANDARD SOFTWARE CORPORATION.

THE XEROX 820: EASY TO USE  
This Amazing machine is perfect for: *Secretaries* who type documents less than 10 pages; *General Ledger* purposes; *Job Costing and Scheduling*; *Financial planning*; *Business scenarios*; *Inventory*; *Engineering* tabulation & bookkeeping; *Real Estate* applications; *Managers* for forecasting & business analysis; *Wholesalers* tracking sales; *Medical* billing; the list goes on!!!

**CALL NOW! ORDER NOW!**  
**GET \$150 CREDIT TOWARDS  
PURCHASE OF XEROX SOFTWARE!**

**Software Specials**  
**Supercalc \$259.00**  
**T/Maker II \$259.00**

**LARGEST  
SELECTION OF  
CP/M<sup>®</sup> SOFTWARE  
IN U.S.A.**

CP/M<sup>®</sup> is a registered  
trademark of Digital  
Research, Inc.

**STANDARD SOFTWARE  
CORPORATION OF AMERICA**

10 MAZZEO DRIVE, RANDOLPH, MA 02368

**(617) 963-7220** ✓306

★ SOFTWARE ★ HARDWARE ★ SUPPLIES ★ DISCOUNT PRICES



# What You See Is What You Get

By David C. Goodfellow

I bought my Apple II in August of 1978, mainly for word processing. Unfortunately, at that time Apple II word processing was just a dream.

But if ever a dream has come true, word processing is it. Today you can pick from many systems for the Apple, and seldom go far wrong. They all try to make a typewriter of the Apple, and they all claim to be the best on the market—and the beauty of it is that most of them seem to have one or two features that back up that claim.

This is a happy problem for the buyer; happy because he now has a choice, and a problem because there are so many good word processors to pick from. The difficulty is not in finding a system that works, so much as finding one that fits your work habits and the kinds of typing jobs you wish to do.

It's important to pick the right program for two reasons. First, few of us can afford to buy one word processing program after another at \$50 to \$250 a clatter. Second, becoming proficient in the use of any word processor, no matter how basic, requires much time. If you can pick software that's right for you, and stick with it for all your word processing needs, you're far better off than if you have several systems and are master of none.

Magic Window, by Artsci (10432 Burbank Blvd., North Hollywood, CA 91601, 213-985-2922), is a good, serviceable system with several features that make it exceptional. One of these is that it makes your Apple act more like a typewriter than do most other word processing systems. Designed with a "what you see is what

you get" concept, Magic Window puts a simulated sheet of paper on the screen. When you type, the words appear on the screen in the location they will occupy on the paper. With one or two minor exceptions, formatting commands are done elsewhere, so they do not clutter up the screen.

Another feature that I especially like is the fact that you can save your files in either of two ways—formatted (binary) or unformatted (text). You can save the same file both ways, as long as you use a different file name.

Binary files are great. They take less disk space than text files, and are saved and loaded faster. In most cases I would prefer to save my text in a binary file.

But text files do have their uses. One of these is data communication. If you want to squirt a letter or a program to a friend with another computer (whatever its brand name), you can send a text file over the telephone. That's one of the few ways different brands of computers can talk to each other.

Also, a word processor which can use text files can be used to debug—or create—other software. Write a program with Magic Window, and save it as a text file. Execute that file and your program's ready to run. If it needs debugging, suck it back into Magic Window and use its editing tools.

## Details

The program is fully menu-driven. Menu selections take you in for specific functions, and menu selections bring you out. The master menu, called Subsystem Menu, gives you six choices—Editor Subsystem, Format Subsystem, Filer Subsystem, Printer Subsystem, Configuration

Subsystem and Exit to Basic.

● **Editor Subsystem.** Selecting the editor from the subsystem menu gives you a simulated page on the screen, on which to type. Here you type whatever text you wish, backspacing to correct typographical errors that you may spot as you go along. The program gives you a window to the page, so you can pretty much see what the page will look like. Since the Apple II screen is only 40 characters wide, this window does not show the whole page—but what you do see is a good representation. You back out of the editor function through a control sequence SHIFT-CTRL-P—the three keys held down at once. This returns you to the subsystem menu.

Editing functions include—

*Cursor motion group* (left, right, up, down, up half-window, down half-window, top of file, end of file, set tab stop, clear tab stop, clear all tab stops, tab left, tab right, assign search string, search for assigned string and cursor to page sequence)—This last item allows you to find the top of any selected page in your document.

*Character editing group* (delete, insert, copy and control characters)—The control characters command allows you to enter a control character in text to implement a special printer function you may have.

*Line editing group* (deleted line stack, delete, recover, moving lines, insert, clear, split, glue, justification)—Justification includes center line, left justify line, right justify line, expand line (left/right justify) and pack line. Justification is done on-screen, a line at a time, and with use of the REPT key is quite fast. Split-and-glue is the program's equivalent of the cut-and-paste operation many typists go through to avoid retyping the doc-

*Address correspondence to David C. Goodfellow, PO Box 66834, Seattle, WA 98166.*

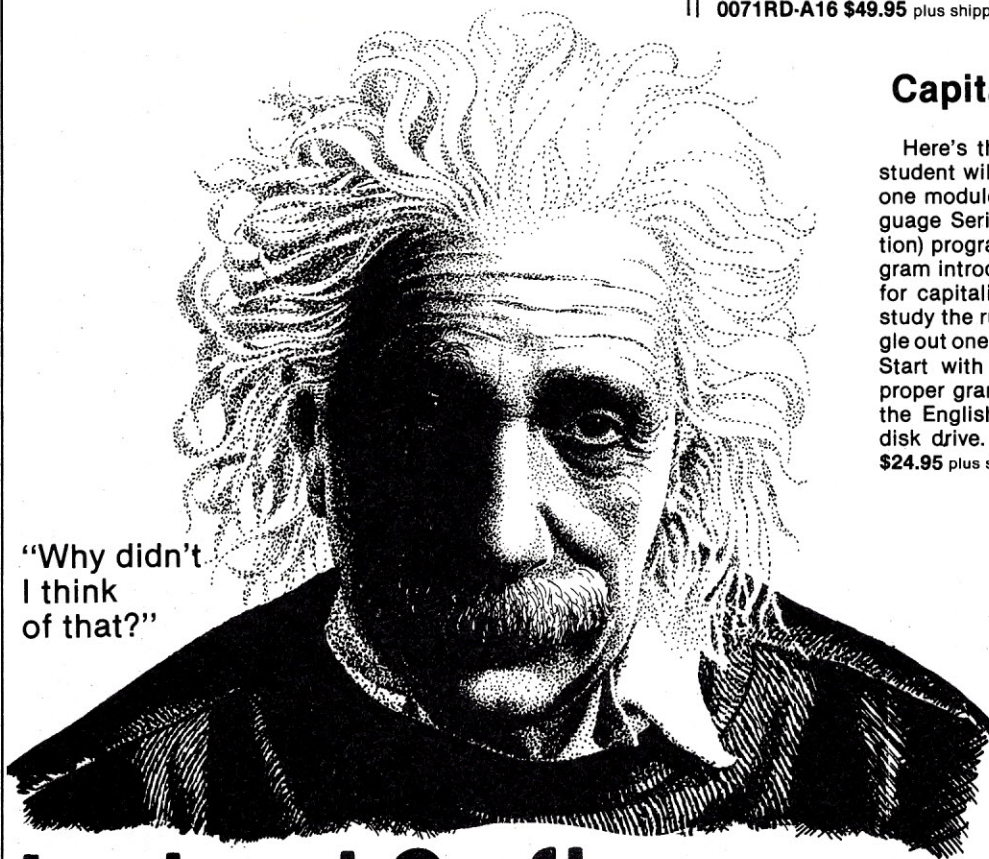


# Education = MicroComputers.

# E = MC\*

**\*to the power of  
Instant Software**

Einstein's equation helped explain the properties of relativity, but didn't do much to speed the learning process. Instant Software's equation *means* individual attention and greater comprehension. Everyone knows the best student-teacher ratio is 1:1. That was a problem in years past, but now it's as easy as C.A.I. (Computer-Aided Instruction). These Instant Software programs will guide and teach each lesson with the infinite patience only a computer can provide, thus allowing students to progress at their own pace. Einstein had the right idea, but if he'd only known then what we know now. ....



"Why didn't  
I think  
of that?"

# Instant Software™

Peterborough, New Hampshire 03452

A division of Wayne Green Inc.

REVISED

## Typing Teacher (for the TRS-80™)\*

A complete seven-part package that guides you from familiarization of the keyboard through typing words and phrases to mastery of touch-typing. Your video monitor becomes a bottomless page for typing practice, and your own private TYPING TEACHER, ready to teach when you're ready to learn. Model I, Level II, 16K; Model III, 16K. **Order No. 0099R-A14 \$12.95** plus shipping.

## Teacher's Aide (for the TRS-80™)\*

Now you can have the benefit of Computer Assisted Instruction (CAI) in your own home. The Teacher's Aide program allows you to create tailor-made lessons for your child. The features of this program include the ability to review material before taking the lesson, a provision for hints to help answer questions and graphic displays as a reward for answering all questions correctly. Once you've created a lesson, you can save it and create an entire sequence of lessons.

The Teacher's Aide package is perfect for parents, teachers, and students who need the unlimited patience only a computer can provide. Level II 32K. **Order No. 0214RD-A13 (disk-based) \$39.95** plus shipping.

## Geography Explorer: U.S.A. (for the TRS-80™)\*

This program allows your child to travel the country and learn vital facts about each of our 50 states. Geography Explorer offers the most fascinating way of learning yet. Learn each state's name, capitol, largest city, nickname, etc. As a bonus, this package offers the capability of light pen use. Model I, Level II 16K, expansion interface with 16K, one minidisk drive. **Order No. 0071RD-A16 \$49.95** plus shipping.

## Capitalization (for the Apple™)\*\*

Here's the most patient grammar teacher a student will ever have... CAPITALIZATION. It's one module among several in the English Language Series of CAI (Computer Aided Instruction) programs from Instant Software. This program introduces and exercises the twelve rules for capitalization in English. The student may study the rules in order from 1 to 12, or may single out one particular rule for study and practice. Start with CAPITALIZATION and graduate to proper grammar and a better understanding of the English language. Applesoft Basic 32K, 1 disk drive. **Order No. 0339AD-A15 (disk-based) \$24.95** plus shipping.

### TO ORDER:

See your local  
Instant Software dealer  
or call toll-free  
1-800-258-5473  
orders only  
In New Hampshire  
1-603-924-7296

Mon.-Fri. 8:00 am-4:30 pm E.S.T.



408

\*TRS-80 is a trademark of Radio Shack division of Tandy Corp.

\*\*Apple is a trademark of Apple Computer Company



ument. The line is split at the chosen point, and new text is added at the split.

*Other functions* (assign title line, and exchange key sets)—Assign title line allows you to put a title and page number in what is normally the white space of the top or bottom margin. Exchange key sets makes available the backslash, left-and-right brackets and left-and-right curly brackets on the display—characters not normally available on the Apple keyboard.

●**Format Subsystem.** Format allows you to specify page length, left margin, text width and whether or not you wish double-spacing.

●**Filer Subsystem.** Filer choices are change disk options, files directory, save formatted file, load formatted file, unformatted load/save, delete file and clear file in memory. Each function is supported by its own directions, appearing on the screen when that function is selected.

Points of interest in the Filer Subsystem are change disk options and unformatted load/save. Disk options that may be changed are disk slot and

drive number, and the volume number of the disk to be used. Unformatted load/save gives you the choice of change range option, save file, load file and insert file at cursor. These are powerful features, which you can use to piece together a document from paragraphs in a text file. Suppose you have document A in memory, and you wish to add paragraphs from document B, which is in a text file. With "change range option" you select the desired part of document B, and with "insert file at cursor" you place it where you want it in document A.

●**Printer Subsystem.** Printer allows you to change print options, print hard copy or print soft copy. Printer options include yes/no answers to "print lowercase" (yes means caps and lower), "print all pages," "stop at page end" (sheet feed) and "mark perforation." Also, you may decide what page number to start at. The option to mark perforation is a valuable feature for special-paper printers such as those which print on heat-sensitive paper. The paper for these comes in rolls, with no means to

show page end. This option puts a series of dashes across the paper to indicate where to cut it for page division.

"Print softcopy" saves the file to disk as a text file. You can do the same thing with an unformatted save from the filer subsystem—except that "print softcopy" gives you a text file that must be printed from another program (sample listing supplied).

There is a reason for this. With the simple print program and a text file saved with soft copy, an untrained operator can handle the printout while you go on to bigger and better things. And, that printout can be interrupted for personalized inputs from the keyboard or a data file.

●**Configuration Subsystem.** This function allows you to change the configuration options, update configuration boot file, boot the configuration file or load the RAM printer driver. These are all well-explained in the manual, and pertain to matching your printer with the program.

### Strong Points

I like the window concept, because

# wabash®

**When it comes to  
Flexible Disks, nobody  
does it better than  
Wabash.**

MasterCard, Visa Accepted.  
Call Free: (800) 235-4137



**PACIFIC  
EXCHANGES** ✓172  
100 Foothill Blvd.  
San Luis Obispo, CA  
93401. (In Cal. call  
(805) 543-1037.)

<b>Z-FORTH IN ROM</b> by Tom Zimmer 5 to 10 times faster than Basic. Once you use it, you'll never go back to basic! source listing add	\$ 75.00 \$ 20.00
<b>OSI FIG-FORTH</b> True fig forth model for OS65D with fig editor named files, string package & much more	\$ 45.00
<b>TINY PASCAL Operates</b> in fig-forth, an exceptional value when purchased with forth. TINY PASCAL & documentation FORTH & TINY PASCAL	\$ 45.00 \$ 65.00
<b>SPACE INVADERS</b> 100% machine code for all systems with 64 chr. video. Full color & sound on C2, 4P & 8P systems. The fastest arcade program available.	\$ 14.95
<b>PROGRAMMABLE CHARACTER GENERATOR</b> Use OSI's graphics or make a complete set of your own! Easy to use, comes assembled & tested. 2 Mhz. boards	\$ 99.95 \$109.95
<b>PROGRAMMABLE SOUND BOARD</b> Complete sound system featuring the AY-3-8910 sound chip. Bare boards available.	\$ 74.95 \$ 29.95
<b>32/64 CHARACTER VIDEO MODIFICATION</b> Oldest and most popular video mod. True 32 chr. C1P, or 32/64 chr. C4P video display. Also adds many other options.	\$ 39.95
<b>ROMS!!!</b> Augment Video Mod with our Roms. Full screen editing, print at selectable scroll, and many more features. Basic 4 & Monitor Basic 3 All 3 for	\$ 49.95 \$ 18.95 \$ 65.00
<b>65D DISASSEMBLY MANUAL.</b> by Software Consultants First class throughout. A must for any 65D user.	\$ 24.95

NUMEROUS BASIC PROGRAMS, UTILITY PROGRAMS AND GAMES ALONG WITH HARDWARE PROJECTS. ALL PRICES ARE U.S. FUNDS. Send for our \$1.50 catalogue with free program (hardcopy) Memory Map and Auto Load Routine.



**OSI Software & Hardware** ✓202  
3336 Avonvale Crescent  
Windsor, Ontario, Canada N9E 1X6  
(519) 969-2500  
3281 Countryside Circle  
Pontiac Township, Michigan 48057  
(313) 373-0468

**progressive computing**



with it I can get a better idea of how the page will look when printed. This concept will be especially useful when the program is made to support an 80-column board—in about December, according to Bill Smith of Artsci.

I also like the choice of binary or text files, as discussed earlier.

The ability to assign a title line within the top or bottom margin (outside the space regularly available for text) is a real convenience.

As a special order option, Artsci supports the special features of a number of printers—Diablo and Epson among them. The Diablo package includes incremental spacing, which I consider to be important. It makes the program that much more capable of competing with the expensive systems used by many large companies.

A deleted line is not necessarily lost forever. Instead, it is placed on a stack of such lines, and may be replaced in its original position or moved to another location. As many as 16 lines may be moved at one time in this fashion.

The manual is excellent, with one

exception (discussed below). All the necessary information is there, at a level even I can understand. Also included is a color crib sheet to be posted nearby for reference. This sheet is a drawing of the Apple keyboard, with each key's control function defined. The drawing is also reproduced in the manual itself, in black and white.

### Weak Points

The pack line function deletes all extra spaces between words. This is a good function for making room to insert a forgotten character and so on, but it is not selective. Typing rules call for two spaces after a period ending a sentence. Pack line deletes the second space, and it is often quite difficult to replace it. The problem is compounded when a line is expanded after packing, for the result is often one space after the period and two spaces somewhere else.

Although the program has a good search string function, it could do with a find-and-replace, in which a selected phrase or word is automatically replaced by another. I imagine

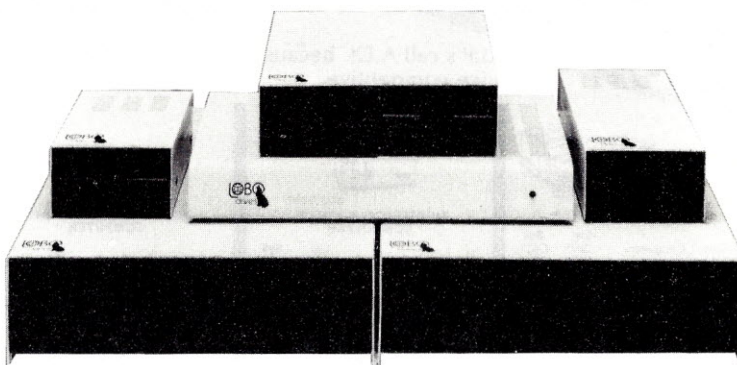
this would be difficult to do with a program such as this which specifies line length before typing is started.

The structure of the program does not allow changing the line length of an existing document, unless you go through the hassle of split-and-glue before printing with the new line lengths. My particular application sometimes demands this, to print out the same document with a different type size and format. But my application is probably not typical.

Although the manual is excellent, I think one more section is in order for a program of this complexity. That is an exercises chapter which takes you through the system—inputting text, exercising all the editing functions, saving to disk in all the ways possible and outputting to the printer. The manual as it stands is a reference book—it needs to lead the user through some hands-on experience.

The manual also should tell the reader what options are available for the system—such as printer routines for specific printers. These routines are available, and they make the system that much more valuable. The

## LOBO Add-On Disk Drive Subsystems For Apple, TRS-80, S-100 Based Computers



**Expansion and enhanced capabilities** are key words in achieving full utilization of your computer system. Our complete line of LOBO disk drive subsystems are the ideal, cost-effective way to provide the expansion capabilities you need to meet your system growth requirements. All of our subsystems are complete, thoroughly-tested, 100% burned-in, and feature a 1 year 100% parts/labor warranty.

### APPLE

\*Double Density Controller

3101	Minifloppy, \$399	31011 Minifloppy w/interface card \$489
8101CA	One SA800 in cabinet w/power, DDC* Controller, cable and manual \$1449	
8202CA	Two SA800 in cabinet w/power, DDC* Controller, cable and manual \$1889	
5101CA	One SA850 in cabinet w/power, DDC* Controller, cable and manual \$1759	
5202CA	Two SA850 in cabinet w/power, DDC* Controller, cable and manual \$2364	
LCA-22	Double Density Controller only \$599	

### S-100 BASED COMPUTERS

MODEL NO.	DESCRIPTION
4101C	SA400 in cabinet w/power \$369
8212C	Two SA801 in cabinet w/power \$1329
5212C	Two SA851 in cabinet w/power \$1799

### GENERAL

MODEL NO.	DESCRIPTION
8212C	Two SA801 in cabinet w/power \$1329
5212C	Two SA851 in cabinet w/power \$1799

### TRS80

MODEL NO.	DESCRIPTION
4101C	SA400 in cabinet w/power \$369
8101C II	One SA800 in cabinet w/power for Mod. II \$909
8202C II	Two SA800 in cabinet w/power for Mod. II \$1349
LX80	Double-density expansion interface \$641
RS232	Dual Serial Port Option \$75



JR

**INVENTORY CO.,**  
P.O. Box 185, Santa Ynez, Ca., 93460  
(805) 688-8781



## SHARE YOUR IDEAS!

**Wayne Green Books announces**

April 1, 1982 deadline for

**submission of new manuscripts**

for consideration for

**the Fall Book List.**

For submissions procedures and further information, contact Chris Crocker, Editor, Wayne Green Books, Peterborough, New Hampshire 03458.

## CORRECTIONS

The correct title of the article by Michael Brandt and Michael Brodner in the October 1981 issue of *Kilobaud Microcomputing* (p. 80) is "Distributed Intelligence Networks in the Office Environment."

The program listing of "An Incredible High-Speed Journey to the Stars" as published in the September 1981 *Kilobaud Microcomputing* (p. 172) is incomplete. The following lines should be added to the end of the program:

```
1710 REM ROUTINE TO READ DATE.
1720 INPUT "Type date here: ",M8,D8,Y8
1730 IF M8>12 THEN 1770
1740 IF D8>31 THEN 1770
1750 IF Y8<1800 THEN 1770
1760 RETURN
1770 PRINT "Invalid format. Date must be of the form 8,21,1940"
1780 GOTO 1720
1790 DATA "SiriusCanopusAlpha CentauriVega-RigelProcyonBetelgeuseAltair"
1800 DATA "SpicaAntares"
1810 DATA 2.7,90,1.3,8.0,250,3.5,200.5,1.70,120
1820 DATA 1.6,7.13,14,27,28,31,32,36,37,43,44.
53.54,59,60,64,65,71
```

way it's handled now, follow-up letters are sent to those buyers who send in the registration cards included with the package.

### Conclusion

The more features available on a word processing program, the more complex is its operation. Magic Window is no exception. Making full use of the program's capabilities requires practice. Although you'll be able to do simple jobs with Magic Window almost immediately, it will take some time to become an expert with all its capabilities.

The system requires an Apple II or Apple II Plus with at least 32K RAM and a disk drive. It is more effective with 48K RAM and a second drive, and it will support a lowercase adapter (such as Paymar's) and the Apple Language System, which gives it 10K more text storage.

Magic Window represents an easy transition from typewriter to computer. The program was designed with the typist in mind, and a newcomer to word processing is not likely to be intimidated by it. At \$100 retail, it's a good buy. ■

**NOW!**

## V.I.P.'s Call A.E.I.

V.I.P.'s call A.E.I. because A.E.I. tests before shipping, has expertise on all items offered, and is price competitive.



### TELETYPE COMPUTER

	List	Sell
System 1 Computer	3995	CALL
System 2 Computer	8995	CALL
System 3 Computer	19995	CALL
TS-80 user station	1795	CALL



### TELETYPE TERMINALS

	List	Sell
910 Terminal	699	585
912C Terminal	925	675
920C Terminal	995	730
950 Terminal	1195	950



### NEC PRINTERS

	List	Sell
3510-1 30CPS Serial	2450	2050
7710-1 55CPS SERIAL	CALL	CALL
7720-1 KSR Serial	CALL	CALL
5510-1 55CPS Serial	3055	2495
5520-1 KSR Serial	3415	2895



### NORTHSTAR HORIZON COMPUTERS

	List	Sell
HRZ-2D-32K	3695	2495
HRZ-2D-64K	4195	2895
HRZ-2Q-32K	3995	2890
HRZ-2Q-64K	4495	3250
HDS-18 Hard Disc	5374	3890



### NORTHSTAR SOFTWARE

	List	Sell
Northword D/Q	399	295
Mailmanager D/Q	299	235
Infomanager D/Q	499	365
General Ledger D/Q	999	795
A/R D/Q	599	475
A/P D/Q	599	475



### TEXAS INSTRUMENTS PRINTERS

	List	Sell
TI-810 BASIC	1895	1495
TI-810 Full ASCII	1995	1590
TI-810 FLO/CP	2195	1760
TI-820 R/O BASIC	1995	1625
TI-820 KSR Package	2395	1950



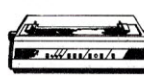
### NORTHSTAR ADVANTAGE COMPUTER

	List	Sell
ADV-2Q-64K	3995	CALL
SIO Board	175	CALL
PIO Board	200	CALL
FPB Board	399	CALL
Graphics Option	299	CALL



### SYSTEMS GROUP

	List	Sell
2800 Computer	5035	3595
DM-6400 Memory	760	585
DMB-6400 Memory	995	735
CPC-2813 CPU-I/O	460	365
FDC-2801 Controller	465	370



### QUME PRINTERS

	List	Sell
Sprint 9 35CPS R/O	1995	1700
Sprint 9 45CPS R/O	2300	2000
Sprint 9 55CPS R/O	2400	2050
Full Control Option	155	150
Memory Option	150	150



### MORROW DECISION COMPUTER

	List	Sell
Decision 1 BASIC	1725	1350
Decision 2	CALL	CALL
85K Static Ram	1000	780
Switchboard I/O	259	210
Select drives from Morrow disc systems for desired configuration		



### MORROW DISC SYSTEMS

	List	Sell
Discus 2D 1 Drive	1095	850
Discus 2D 2 Drive	1875	1450
Discus 2+2 1 Drive	1395	1150
Discus 2+2 2 Drive	2495	1945
M26 Hard Disc	4495	3525
M20 Hard Disc	4795	3850



### MODEMS

	List	Sell
Cat Modem	189	140
D-Cat	199	150
Auto-Cat	249	190
Apple-Cat	389	310
DC Hayes Micro-100	379	330



### ZENITH DATA SYSTEMS

	List	Sell
VM-121 Green Monitor	150	125
Z-19 Terminal	995	750
Z-89 Computer	2895	2140
Z-90 Computer	3195	2490
—Call for Accessory Pricing—Peachtree Software Available		



### MICROPRO SOFTWARE

	List	Sell
Wordstar	495	300
Apple Wordstar	375	275
Spellstar	250	190
Mailmerge	150	100
Datastar	350	250
Supersort	250	190



### DISCS—CABLES

	List	Sell
Memorex 5" 1D	47	27
Memorex 5" 2D	55	36
Memorex 8" 1D	65	40
Memorex 8" 2D	70	45
RS-232 5' Cable	30	20
RS-232 10' Cable	40	25

—SEE THESE PRODUCTS AND MORE IN OUR SHOWROOM—  
PRICES CHANGE DAILY—CALL OR VISIT FOR CURRENT PRICING



**AUTOMATED EQUIPMENT, INC.** ✓96  
18430 WARD STREET, FOUNTAIN VALLEY, CALIFORNIA 92708

(714) 963-1414  
(800) 854-7635



# Grasp The Future ...NOW!

## H8 HARDWARE

The Most Extensive Line of Hardware Support for The H8®

**\*DG-80/FP8**

Z80® based CPU including the powerful FP8 monitor — Both only \$249.00.  
The acclaimed FP8 monitor package is now included with the DG-80 CPU!

**\*DG-64D/64K RAM Board**

Reliable, Low Power, High Capacity Bank-selectable RAM  
Priced from \$333.00 (0K) to \$529.00 (64K)

**\*DG-64D5 64K/5 volt only RAM Board**

SUPER low power, Reliable, High Capacity, Bank Selectable RAM  
from \$333.00 (0K) to \$799.00(64K)

**\*DG-32D/32K RAM Board**

Low cost, Dependable RAM for the H8 Priced from \$233.00 (0K) to \$339.00 (32K)

**\*DG-ADP4**

H17-4 MHz disk adaptor — \$19.95

## H8/H89 SOFTWARE

DG Now Offers Software Support for HDOS 2.0

**\*DISK MANAGEMENT UTILITY PACKAGE — \$49.95 (Source: Add \$40.00)**

"Universal Dump"  
Intelligent DISK DUMP Utility  
"Universal Dup"  
Disk Copy Utility  
"BAD"  
Block Scan Utility

**\*ARCHIVE — \$49.95 (Source: add \$40.00)**

Diskette Back-up Utility

**\*SYSCMD/plus — \$39.95 (Source: Add \$30.00)**

Enhanced HDOS 2.0 system command processor provides extended commands and capabilities.

**\*PRELOAD — \$29.95 (Source: Add \$20.00)**

Auxillary RAM Utility

## COMPATIBLE SOFTWARE FROM THE COMPATIBLE HARDWARE LEADERS!

Watch for our New Product Announcements for the H8® AND H89!!

Heath® and H8® are registered trademarks of Heath Corporation, Benton Harbor, Michigan.  
Z80® is the registered trademark of Zilog Corporation.

**D·G ELECTRONIC DEVELOPMENTS CO.** ✓145

**Ordering Information:** Products listed available from DG Electronic Developments Co., P.O. Box 1124, 1827 South Armstrong, Denison, Tx. 75020. Check, Money Order, VISA or MasterCard accepted. Phone orders (charge only) call (214) 465-7805. No COD's. Freight prepaid. Allow 3 weeks for personal checks to clear. Texas residents add 5%. Foreign orders add 30%. Prices subject to change without notice.



Don't put off those interface projects any longer. Construct a parallel port board for the C1P and open up a whole new world of applications.

# Arm the OSI With Parallel Ports

By Roy Griffin

In the months before I bought my Ohio Scientific Challenger 1P, I had collected several hardware projects that I planned to build and use with it. All these projects had one thing in common: they all interfaced through one or more parallel I/O ports, which the single-board C1P doesn't have.

I could have bought OSI's parallel

port board, but I would also have had to buy their expansion (610) board. Since I had already spent all I could afford, I decided to design my own board. For the C1P or Superboard II, it can turn your computer into an important tool for control applications in the real world.

If you don't have a C1P or Superboard II, read on; with an under-

standing of the concepts involved and with some modifications, this board could be used with virtually any eight-bit microcomputer.

## The Intel 8212

The heart of the parallel port board is the Intel 8212 I/O port IC. I chose this chip for several reasons: it is inexpensive and easy to get (you can mail order it from almost any electronics or computer parts supplier for about \$3.50), and it's versatile. The chip can be configured as an input port or as an output port, and it has tri-state capabilities.

Fig. 1 shows the 8212 configured as an input port. With either pin 1 high (+5 V) or pin 13 low (0 V), the output of the 8212, which is connected to the data bus, is in the tri-state or high-impedance mode. This is equivalent, as far as the data bus is concerned, to having the 8212 and the data bus completely disconnected from each other.

When pin 1 is pulled low (grounded) and pin 13 is pulled high (+5 V) at the same time, the output of the 8212 becomes active: a positive-going clock pulse at pin 11 transfers data from the input port lines to the data bus. When the clock pulse goes low the 8212 latches, completing the data transfer. After the transfer has taken place, returning pin 1 high or pin 13 low causes the 8212 to again enter the high-impedance state.

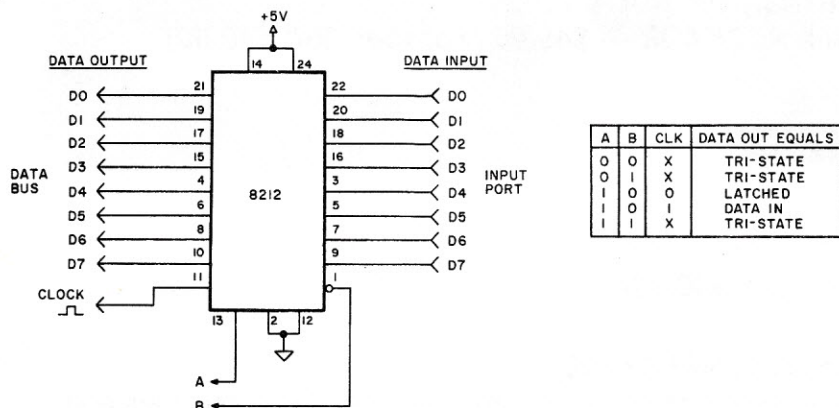


Fig. 1. The 8212 IC as an input port.

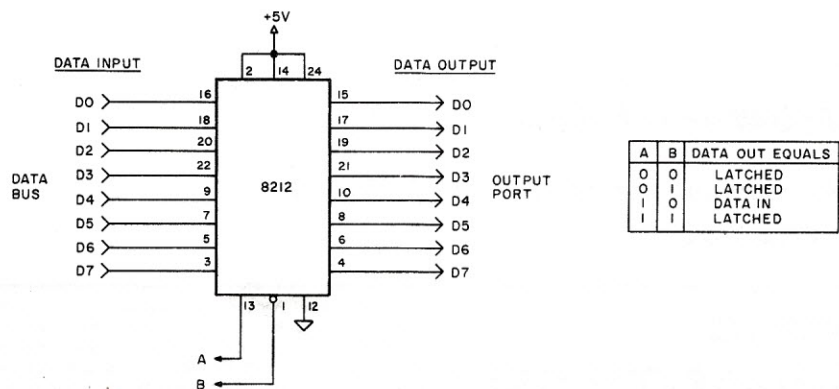


Fig. 2. 8212 output port.

Address correspondence to Roy Griffin, 2906 B East Glen, El Paso, TX 79936.



Fig. 2 shows the 8212 configured as a latching output port. To transfer the contents of the data bus to the output port, you pull pin 1 low and pin 13 high. Returning either pin 1 to (+5 V) or pin 13 to ground will cause the output of the 8212 to latch.

### Designing around the Challenger

The Challenger 1P and Superboard II are based on the 6502 processor. This fact is notable in that the 6502 processor does not have separate control signal outputs for I/O operations and for read/write (memory) operations. This means that the CPU does not know the difference between an I/O port and a memory location. You cannot therefore assign both an I/O port and memory to the same address. Some other processors, such as the 8080 or Z-80, have provisions for just such an overlap of memory and I/O ports.

Since the 6502 processor does not distinguish between memory and I/O ports, you must be careful to choose

as a location for the I/O ports an address that will not conflict with any memory in the C1P or with any memory you might want to add later on.

By consulting a memory map in the user's manual, I decided on decimal locations 63232 through 63235. In analyzing the Superboard II schematics, I noticed that the designers of the C1P skimped a bit on their address decoding: they assigned more than one address to some of their memory and serial port locations. While this is not good design practice from the standpoint of expandability and efficient use of memory space, it does save on parts count and makes things less expensive. I opted for the same approach and only decoded ten address lines in my design.

Fig. 3 shows the address decoding circuitry for the parallel port board, along with the bidirectional bus transceivers (8T28s), an input port and an output port, and some control circuitry to make things happen at the right times.

The output lines of the 74LS155 decoder control which I/O port is to be accessed by pulling pin 1 of the appropriate port low. The buffered read/write line is connected to pin 13 of each of the input ports to enable the input ports only on a memory read cycle. The inverted read/write line connects to pin 13 of each output port to assure that the output ports are enabled only on a memory write.

The 8T28 ICs of Fig. 3 are not really necessary for the C1P because there are bus transceiver sockets on the board already. However, I have included these ICs on the parallel port board so it can be used with other computers without loading down the data lines. Included in Fig. 3 is some logic circuitry to change the data direction of the 8T28 bus transceivers at the appropriate time.

Fig. 4 shows the remaining two input and output ports. They occupy locations 63234 and 63235 (decimal). The two 74LS365 ICs form an input status port and an output status port.

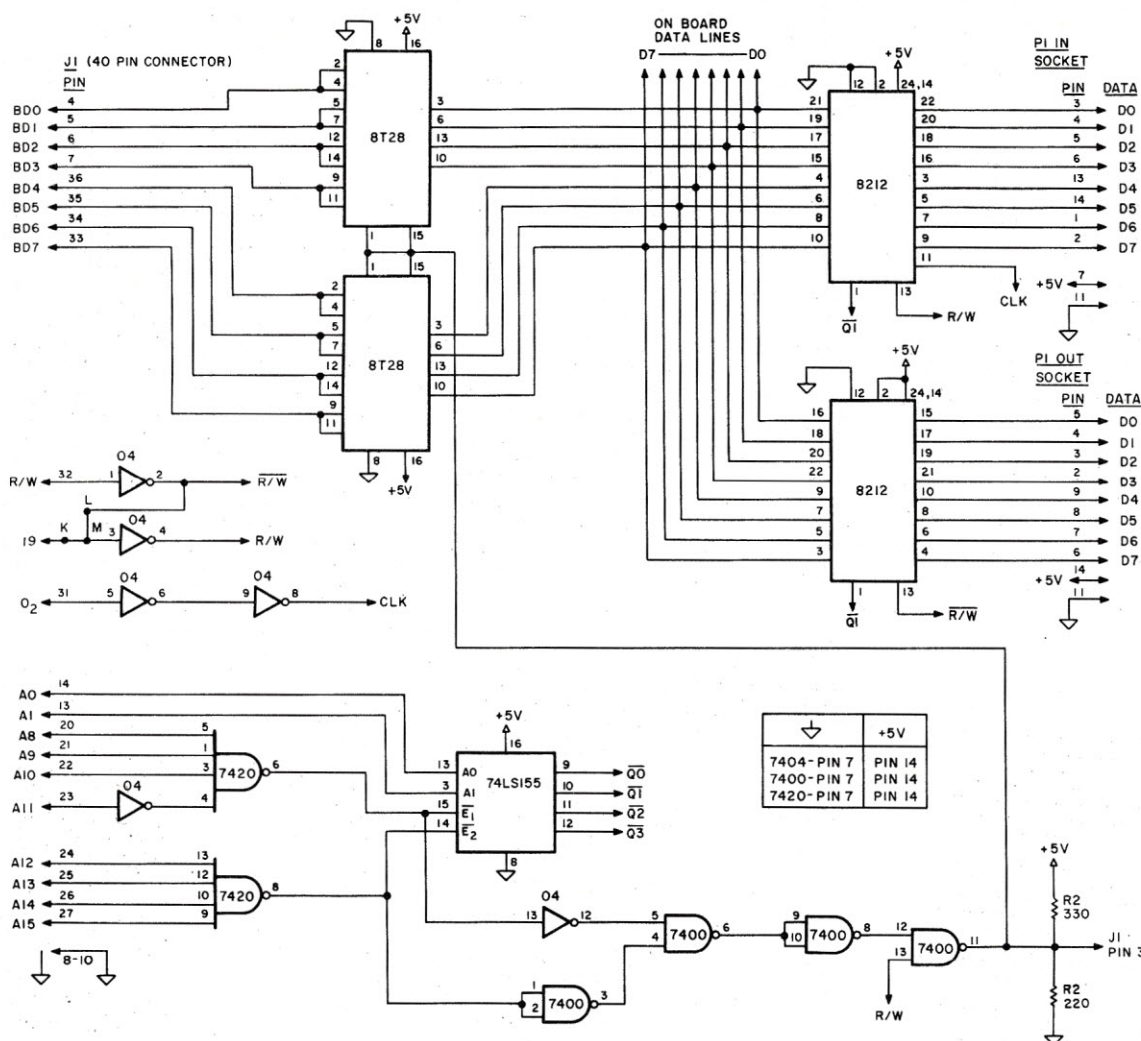
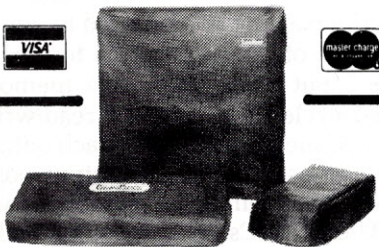


Fig. 3. Port 1 and decoding logic schematic.



# COMPUCOVER®



## COVER YOUR INVESTMENT

- Cloth Backed Naugallyth Vinyl
- Waterproof & Dustproof
- Longer Life
- Improved Reliability
- Two Decorator Colors—Saddle Tan and Black

APPLE COMPUTERS	
Apple Ensemble-covers entire Apple II with 9" video & two stacked disk	\$15.95
Full Apple II.....	12.95
Apple II Keyboard.....	7.95
Apple II Disk.....	3.95
Apple II Disk (stacked-two disk).....	7.95
Apple III.....	14.95
TRS-80 MODEL I	
Keyboard.....	7.95
Cassette.....	4.95
Video Display.....	9.95*
Package Offer.....	18.95*
*NOTE-Add \$3.00 for Expansion Interface	
TRS-80 5 1/4" Disk.....	4.95
Two Disk Cover (side by side).....	7.95
TRS-80 MODEL II	
Entire Unit.....	\$22.95
Keyboard Only.....	7.95
Three Disk Unit (8" Drives).....	18.95
TRS-80 MODEL III	
TRS-80 COLOR COMPUTER.....	9.95
Line Printer I.....	\$16.95
Line Printer II.....	9.95
Line Printer III.....	15.95
Line Printer IV.....	9.95
Line Printer VI.....	14.95
Daisy Wheel Printer II.....	16.95
Quick Printer I.....	9.95
Quick Printer II.....	5.95
CBM-PET COMPUTERS	
CBM-Pet 2001-4001 series.....	\$12.95
CBM-Pet 8032.....	12.95
CBM-Pet 2040, 8050 Disk.....	12.95
CBM-Pet 2022, 4022 Printer.....	9.95
CBM-Pet 2023 Printer.....	7.95
ATARI 800.....	\$10.95
Atari 400.....	9.95
Atari 810 Disk.....	5.95
Atari 425 Printer.....	9.95
CROMEMCO SYSTEM THREE	
Cromemco 3100, 3102 CRT.....	\$19.95
Cromemco 3779 Printer.....	16.95
Cromemco 3703, 3704 Printer.....	18.95
Cromemco 3355 Printer.....	15.95
SUPERBRAIN	
Emulator.....	19.95
Interube.....	19.95
Superstar.....	19.95
HEATH COMPANY	
H-19, H-89 CRT.....	\$18.95
H-17, H-77 Disk.....	9.95
H-27, H-47 Disk.....	12.95
H-8, H-11 Computers.....	12.95
H-14 Printer.....	9.95
H-34, H-44K, H-44 RD.....	15.95
H-34, H-54.....	15.95
DIGITAL EQUIPMENT	
Data System Terminal.....	\$19.95
Decscope Terminal.....	19.95
VT/78, VT/78 Terminal.....	19.95
VT-100 Terminal.....	16.95
Decprinter I.....	15.95
Decwriter II, III.....	18.95
Decwriter IV.....	15.95
OHIO SCIENTIFIC	
Superboard II.....	\$12.95
CAP-DF, single case.....	14.95
CAP-DF, stacked.....	19.95
C2-single case.....	14.95
C2-stacked.....	19.95
C2-OEM, long case.....	19.95
C3-OEM, long case.....	19.95
C3-S1, single case.....	14.95
C3-S1, stacked.....	19.95
WANG COMPUTERS	
CRT Terminal.....	\$18.95
2221 Printer.....	19.95
2221-W Printer.....	22.95
2231 Printer.....	19.95
2261 Printer.....	19.95
HEWLETT PACKARD	
85, 83 Computer.....	\$14.95
7225A plotter.....	9.95
8290 IM disk.....	9.95
Plotter on disk outfit.....	12.95
Compucolor II Entire Unit.....	16.95
Compucolor II Keyboard.....	5.95
Vector Graphic MZ Computer.....	14.95
Vector Graphic Mindless Terminal.....	18.95
MINIMAX II TERMINAL	
Minimax II doubledisk.....	9.95
North Star Horizon.....	14.95
Sorcerer.....	9.95
Texas Instruments 99/4.....	9.95
Intercolor 3621.....	16.95
Poly Morphic System 8813 Computer.....	14.95
Poly Morphic Keyboard.....	7.95
Tano Outpost II.....	22.95
NEC Astra Computer.....	18.95
SOL 20 Computer.....	14.95
IMSAI 8080.....	14.95
CRT's	
Televideo TV1 912 or 920.....	\$14.95
Hazeltine (one size fits all).....	18.95
Soroc IQ 120.....	18.95
Adds Terminals 25, 100, 980, etc.....	19.95
ADM-3.....	14.95
Leedex Video 100.....	9.95
Leedex Video 100-80.....	12.95
NEC JB-1201 Monitor.....	9.95
Visual Tech 200.....	20.95
9 inch CRT.....	7.95
12 inch CRT.....	9.95
PRINTERS	
Epson MX-80 and MX-70.....	9.95
CITOH Starwriter.....	15.95
Okidata Microline 80.....	9.95
Base 2.....	9.95
MPI 88T.....	9.95
Diablo 530.....	15.95
NEC Spinwriter with Keyboard.....	15.95
NEC Spinwriter without Keyboard.....	15.95
Diablo with Keyboard.....	15.95
Diablo without Keyboard.....	15.95
Xerox with Keyboard.....	15.95
Xerox without Keyboard.....	15.95
Qume Sprint III.....	14.95
Qume Sprint V with Keyboard.....	15.95
Qume Sprint V without Keyboard.....	15.95
Teletype 43.....	12.95
IDS 440, 445, 460.....	12.95
Texas Instruments 800 Series.....	18.95
Trendcom 100 or 200.....	9.95
Centronics 101.....	19.95
700, 701, 702, 703, 704, 753.....	18.95
Centronics 779.....	16.95
Centronics P1, 730, 737.....	9.95
Comprint 912.....	12.95
Anadex DP8000.....	12.95
Xymec HY Q1000.....	12.95
Okidata 22, SL125, SL250.....	15.95
DISK DRIVES	
Micropolis 1041, 1042, 1043, 1053.....	\$9.95
Vista Double Disk.....	9.95
Vista 5 1/4" Disk.....	6.95
Matchless 5 1/4" Disk.....	6.95
Lobo Double 8" Disk.....	9.95
Lobo 5 1/4" Disk, 14" long.....	6.95
Lobo 3, 2, 3, 3.....	3.95
MPI B51 or B52 Disk.....	4.95
Percom 5 1/4" Disk.....	4.95
IBM..... write	
DATA General..... write	
CPT..... write	

Send check or money order to:

Include \$1.50 for postage and handling.  
Overseas orders include \$4.00 postage.

DEALER INQUIRES INVITED

COMPUCOVER

P.O. Box 324 (Dept. A)  
Mary Esther, FL 32569  
Phone (904) 243-5793

They can be used to provide necessary handshaking signals such as data ready and data received acknowledge, which ensure that the data transfer between the port and peripheral is done successfully. I think it will become clear how these lines are used when you hook up your first peripheral to the port board. Note that these handshaking signals are provided to or obtained from the peripheral through software.

The 74LS365 ICs are unidirectional buffers. These buffers have two enable pins and tri-state outputs. They work like the 8212 output ports except that in the 74LS365s, the outputs do not latch. They remain in a tri-state condition unless a data transfer is tak-

ing place. The status ports occupy location 63232 and are generally accessed before a data transfer to see if both computer and peripheral are ready to make a data transfer, and after a data transfer to see if the transfer was successful.

## Construction

The component side of the parallel port board is shown in Fig. 5, and the bottom side in Fig. 6. Fig. 7 shows the component placement on the component side of the board. Before you start madly soldering components to the board, be sure to use the board as a template and mark the mounting hole locations on the top of the C1P case. This will make mounting the

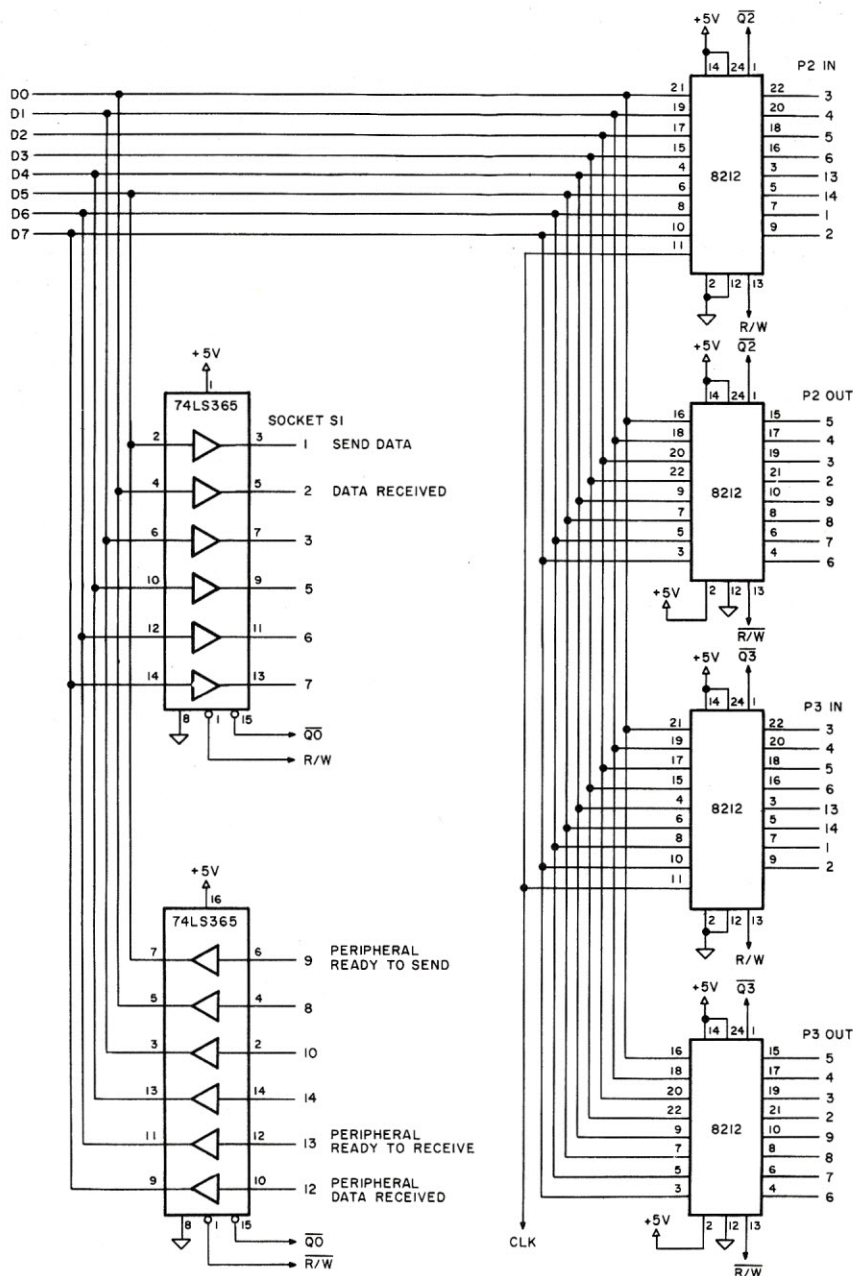


Fig. 4. Ports 2, 3 and status port schematic.



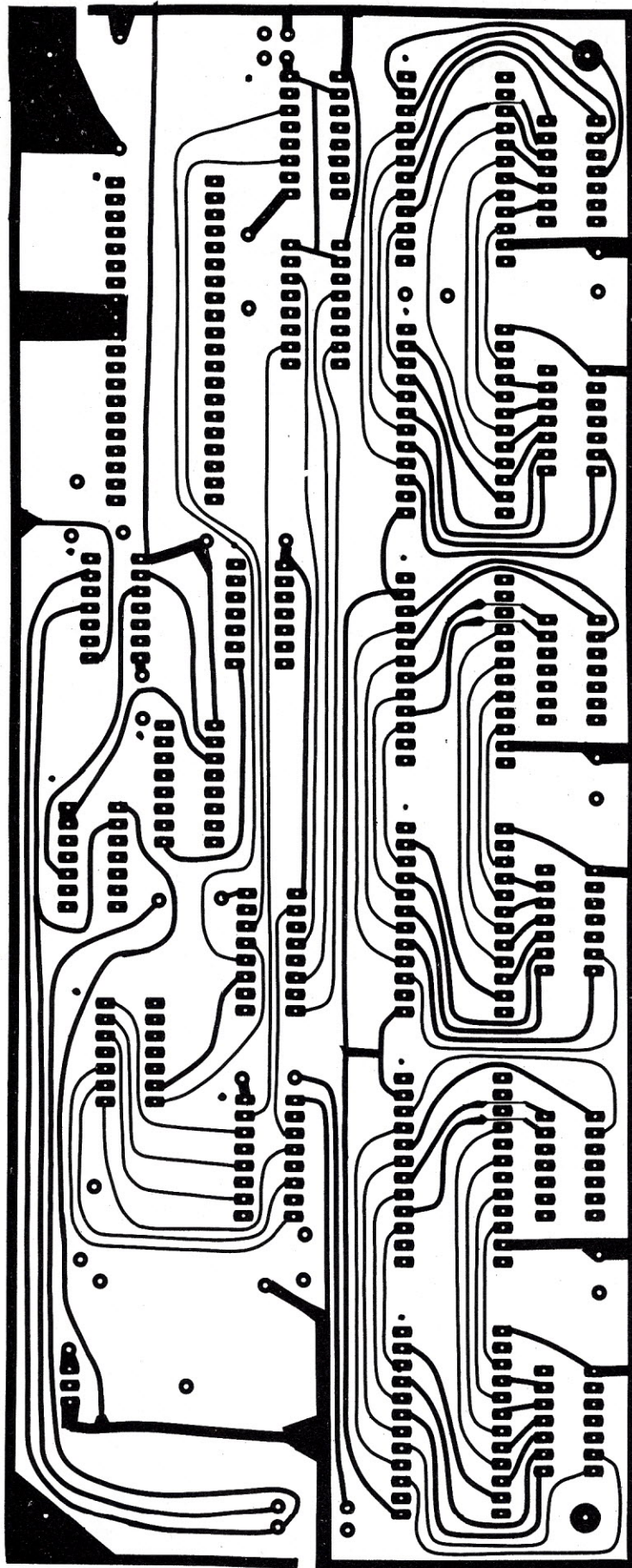
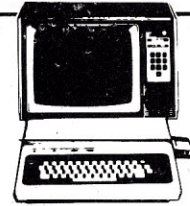
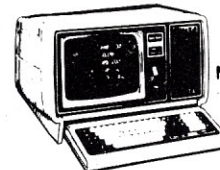


Fig. 5. Component side of parallel port board.

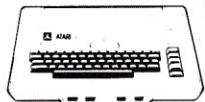
# meet a REAL PLUS



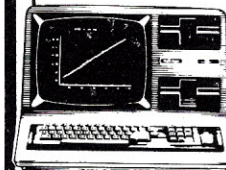
Color Computer 4K \$310  
w/Ext. Basic 16K \$459



Model II 64K  
\$3300



Atari 800 32K \$789



Model III 16K  
\$839  
2 DR + RS232C  
\$2100

These are just a few of our many fine offers — computers, peripherals, modems, printers, disc drives and an unusual selection of package values. Call TOLL FREE today and check us out for price and warranty.

Factory warranties on Apple and Atari equipment. Other equipment carries manufacturer's warranty or Computer Plus 180 day extended warranty. Combined warranties carry Computer Plus 180 day warranty or original manufacturer's warranty.

DEALER INQUIRIES ARE INVITED

Prices subject to change without notice.

TRS-80 is a registered trademark of Tandy Corp.

call TOLL FREE

**1-800-343-8124**

**computer  
plus**

Write for your  
free catalog...

Dept. K  
245A Great Road  
Littleton, MA 01460  
(617) 486-3193

✓362



# Lowest Prices on Personal Computers

**800™... \$749**



**ATARI® 400. \$359**

**hp HEWLETT  
PACKARD HP-85**

**NEW  
LOW  
PRICE!**



**\$2695**

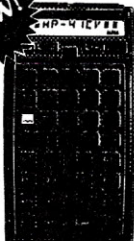
## HP-85 Accessories

5 1/4" Dual Master Disc Drive List \$2500. .... \$2125  
5 1/4" Single Master Disc Drive List \$1500. .... \$1275  
HP 7225A Graphics Plotter List \$2050. .... \$1845  
HP-85 16K Memory Module List \$395. .... \$355  
HP-85 Application Pacs Standard List \$95. .... \$85  
Serial (RS-232C) Interface Module List \$395. .... \$355  
GPIO Interface Module List \$495. .... \$445

**HP-125 \$3089**

**NEW!**

**HP-41CV** with five times  
more memory



**built in.**  
List \$325

**\$249**

**HP-41C**  
List \$250

**\$189**

**HP-83 \$1695**

**Personal  
Computer  
Systems**



609 Butternut Street  
Syracuse, N.Y. 13208

(315) 475-6800

Prices do not include shipping by UPS. All  
prices and offers subject to change without  
notice.

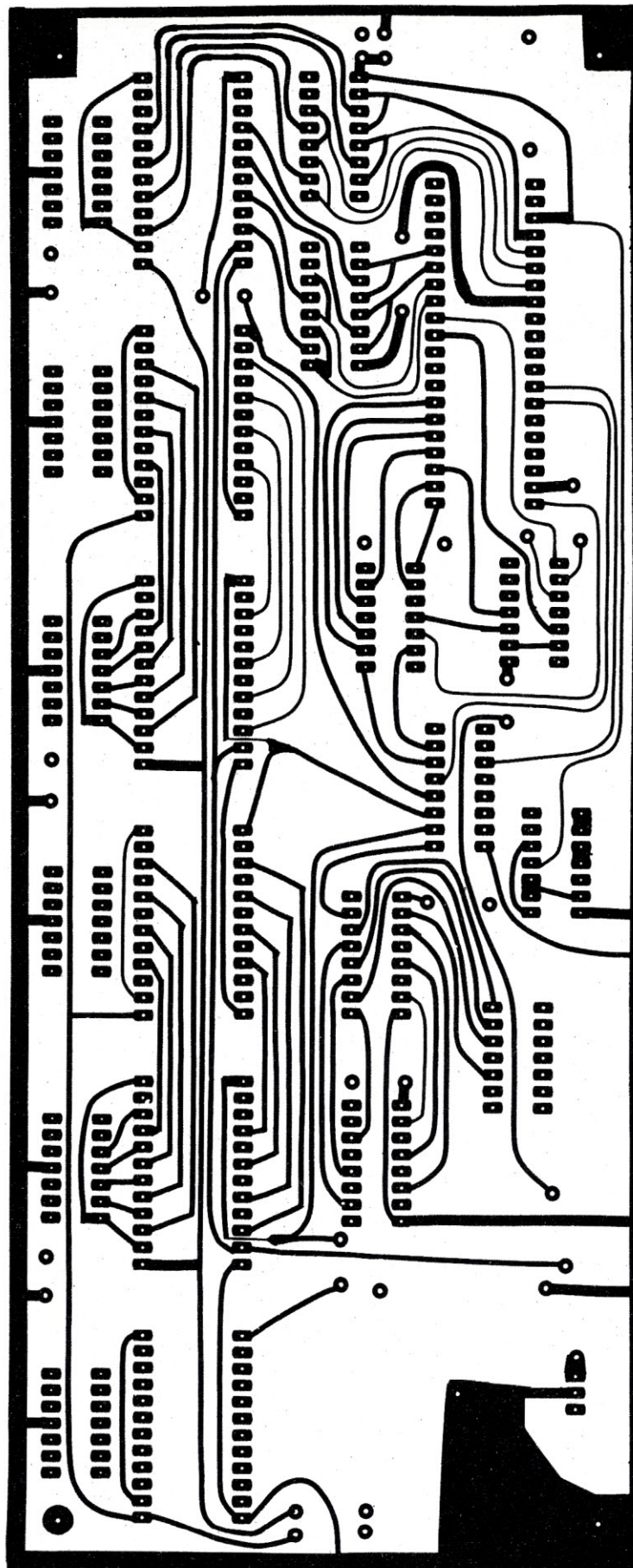


Fig. 6. Bottom side of parallel port board.



board much easier.

All the holes on the board may be drilled with a 60 drill bit (available at any hobby shop) with the exception of the mounting holes. All holes used for mounting purposes—i.e., the four board mount holes and the regulator (7805) mount hole—will require a 3/16-inch drill bit.

If your PC board does not incorporate plated through holes, you must solder every component on both sides of the board. Also, if you don't fully populate the board, you will need to provide feed-throughs in the unpopulated holes or the board will not work. Where IC sockets are needed, use wire-wrap sockets, and solder them in with the sockets standing off from the board at least .2 inches. This .2 inch clearance gives you enough room to get a soldering iron underneath the socket to solder the leads on the top side of the board. It is also better to install the necessary sockets before mounting any other components on the board. Once the socket has been mounted, you can clip off the excess lead length.

Note that there is a small dot near each IC location to indicate the pin 1

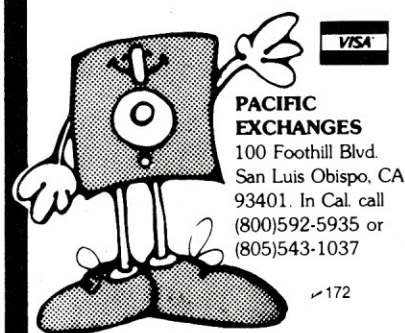
alignment for that IC. A dot is also shown in Fig. 7 to indicate which pin is pin 1. Note also that all ICs face in

Qty.	Items
1	Printed circuit board
6	8212—24-pin IC
2	8T28—16-pin IC
2	74LS365 or 367—16-pin IC
1	74LS155—16-pin IC
1	7404—14-pin IC
1	7420—14-pin IC
1	7400—14-pin IC
1	330Ω 1/4 W resistor
1	220Ω 1/4 W resistor
1	7805 regulator
1	Regulator heat sink
1	330 uF/10 V capacitor
1	40-pin DIP socket
6	14-pin DIP socket
1	16-pin DIP socket
3	.01 uF/50 V disc. cap.
1	40-pin DIP cable
4	1/4" spacers
4	1/2" screw 6/32
4	Nut 6/32
4	Lockwasher
Misc.	Wire

Parts list.

## MEMOREX FLEXIBLE DISCS

BUY THE BEST FOR LESS. Lowest prices. **WE WILL NOT BE UNDERSOLD!!** Buy any quantity. Call free (800) 235-4137 for prices and information. Dealer inquiries invited and C.O.D.'s accepted.



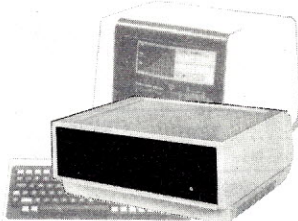
**NOW!**

## NEW PRODUCTS! NOW AVAILABLE FROM AUTOMATED EQUIPMENT

### TELEVIDEO SYSTEM I

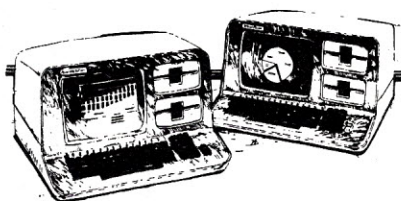
The Televideo System I is a CP/M® based single-user computer system. State-of-the-art design and single board construction accounts for Televideo's reliability and exceptional price performance. Cobol, Basic, PL/1 and Fortran are just a few of the high level languages available. As your needs grow so can your Televideo computer system. The System I can be a satellite computer of a larger network of user stations using the multi-processor multi-tasking System II or System III. System I includes TS-81 computer, Televideo 910 terminal (950 terminal available at additional cost) and CP/M® 2.2. Nation wide on-site service is available through General Electric service company.

**System I specifications:** Z80A, 64K Ram, 4K diagnostic Eprom, two 5" 360K drives, serial and parallel port.



CP/M® is a licensed product supplied by Digital Research, Inc.

See Televideo System Ad.



### NORTHSTAR ADVANTAGE COMPUTER

The Northstar Advantage Computer is an integrated package including full graphics capability. Line charts, bar graphs, pie charts and 3 dimensional displays are all possible as part of Northstar's optional graphics/DOS operating system or CP/M® graphics package. All Northstar applications software is available for the Advantage Computer. Slots for 6 additional expansion cards are included.

**Specifications:** Z80A CPU, 64K Ram, Green screen 12" monitor, 240 x 640 pixel graphics resolution, sculptured typewriter-like keyboard, two 5" 360K drives.

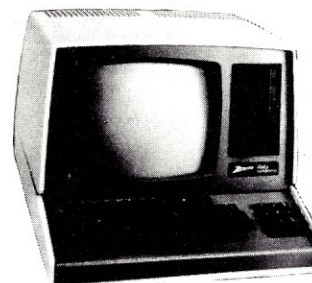
### ZENITH

Zenith Data Systems with world famous quality and reliability are now available from A.E.I. The Z89 and Z90 are standalone micro computers with a one piece design that simplifies installation and operation. With the board line of PeachTree accounting software and Micro-Pro word processing software the Zenith computers are the ideal small business systems. Heathkit/Zenith educational courses are available making the Zenith computer an excellent choice for the first time buyer.

#### Zenith specifications:

Z89—48K ram standard, Z80 cpu, 2 serial ports, built in 12" terminal, one 5" 100K drive, expandable.

Z90—64K ram standard, Z80 cpu, 2 serial ports, built in 12" terminal, one 5" 200K drive, expandable.



**V.I.P.'s call A.E.I.**

Because A.E.I. tests before shipping, has expertise on all items offered, and is price competitive.



**AUTOMATED EQUIPMENT, INC.** ✓96

18430 WARD STREET, FOUNTAIN VALLEY, CALIFORNIA 92708

See these products and a full line of peripheral equipment in our showroom.

(714) 963-1414

(800) 854-7635



the same direction with respect to pin 1 on Fig. 7. You will notice on Fig. 7 some jumpers labeled A through M. These jumpers should be made of insulated wire to prevent shorting out traces on the board.

Once all the components have been mounted on the board, some dc power source of between 6 and 8 V must be connected between the input of the 5 V regulator (7508) and ground. I used the rectified output of the power supply provided in my C1P. This is

all right as long as the power supply has the ability to provide the extra current needed to run the parallel port board. If the power supply is inadequate you will most likely either blow a fuse or have trouble getting your computer to operate properly. A heat sink on the 7805 regulator is necessary to keep the 7805 from overheating.

After the board has been assembled, drill 3/16-inch holes in the top of the C1P case, open it up and mount

the board with the I/O port sockets facing toward the back of the computer. You will need to remove the six screws that hold the keyboard in place. The port board will mount between the computer board and the top of the case. It will probably be easier to test the port board with the C1P in this disassembled condition. Watch what you touch, though. There are some dangerous voltages near the on/off switch.

After mounting the board on the inside of the C1P case on 1/4-inch spacers, plug in a 40-pin DIP jumper cable (you'll need about 12 inches) between the C1P expansion socket (J1) and the 40-pin socket on the I/O port board. Make sure that the pin 1 cable mark-

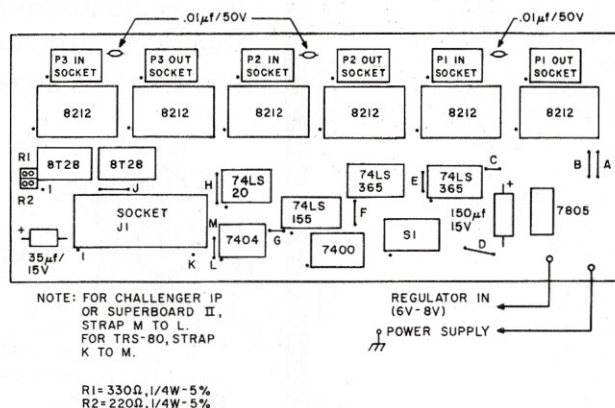


Fig. 7. Component placement.

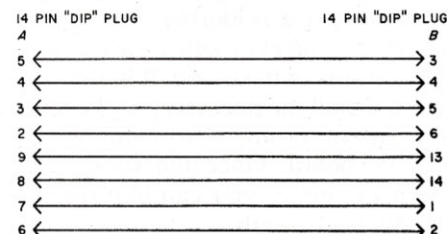
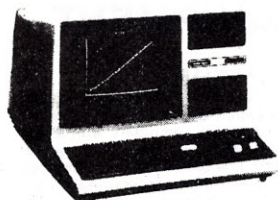


Fig. 8. Test cable wiring diagram.



### TRS-80\* MOD III 48K

WITH YOUR CHOICE OF MPI DISK DRIVES INSTALLED. UP TO 4 MEG ON LINE STORAGE.

48K MOD III with (2) INTERNAL 40trk DRIVES	\$1859.00
AS ABOVE EXCEPT WITH (2) INTERNAL 80trk DRIVES	\$2119.00
AS ABOVE EXCEPT WITH (2) INTERNAL 40/40trk DRIVES	\$2149.00
AS ABOVE EXCEPT WITH (2) INTERNAL 80/80trk DRIVES	\$2449.00
RS232 INTERFACE INSTALLED -- ADD --	\$ 89.00
External add on Drive Cable	\$ 25.00
B51's-40trk	\$ 309.00
B52's-40/40trk	\$445.00
B91's-80trk	\$ 429.00
B92's-80/80trk	\$579.00

MOD III TRSDOS 12 DISKETTE	\$14.95
MOD III TRSDOS MANUAL	6.95
MOD III DOSPLUS **	99.95

\*\* required for double-head or mixed drives

6 MONTH  
LIMITED  
WARRANTY  
ON PARTS  
AND LABOR

**LEVEL IV PRODUCTS INC.**  
32461 SCHOOLCRAFT  
LIVONIA, MICHIGAN 48150  
toll free 800-521-3305  
in state 313-525-6200



visa-master card-C.O.D.

## UV EPROM ERASER



**\$49.95**

- ERASES ALL UV ERASABLE EPROMS (2708, 2716, 2532, 2564, etc.)
- QUICK FIFTEEN MINUTE ERASE TIME
- ERASES OVER FIFTEEN EPROMS AT A TIME
- LAMP LIFE, 7700 HOURS
- TIMER AND SAFETY INTERLOCK SWITCH OPTION ADD \$20.00

### THE BEST 6809 SINGLE BOARD COMPUTER AVAILABLE

- Floppy Controller
- Printer Port
- RS-232 Port
- SWTPC compatible
- Runs TSC Flex
- Full Documentation

PRICE: **\$389.00**

FOR THE SS-50 AND S-100 BUS

ASSEMBLED, TESTED, 48 HOUR BURN-IN, 90 DAY WARRANTY

2114 RAM 300 ns	\$2.95	STRAIGHT FROM THE FACTORY & GUARANTEED.
2716 EPROM 550 ns	\$4.50	
EPROM PROGRAMMER for 2716, 2732	\$99.50	
In Circuit Emulator for 68xx, 8085, Z80	\$99.95	

WE ACCEPT VISA, MASTERCARD, C.O.D., CHECKS

PHONE ORDERS (305) 974-0967

**LOGICAL DEVICES INC.**

781 W. OAKLAND PARK BLVD. • FT. LAUDERDALE, FLORIDA 33311

ADD: \$3.00 SHIPPING, \$2.00 C.O.D. CHARGES



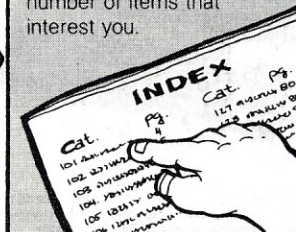
# How to Buy or Sell Computer Equipment and Software

and come out a winner

START HERE  
WITH...



Begin your search in the index of Computer Shopper's bargain filled pages. Locate the category and page number of items that interest you.



Computer Shopper's easy-to-read format makes your search quick and simple with classifications at the top of each column in bold black headings.



Congratulations, you're a winner whether you buy, sell or trade in the computer marketplace by subscribing and using Computer Shopper's action yellow pages. And for your first bargain, take advantage of a **FREE** issue of Computer Shopper as a "Special Get Acquainted Offer."

Act today and receive your first issue free in addition to the \$10, one year/12 issue regular subscription. Of course, if you are not 100% satisfied, you may cancel and still keep the free issue just for trying Computer Shopper.

**BONUS:** New subscribers are entitled to a complimentary classified ad. Use it for pre-owned equipment or software or as a want-to-buy ad. Just print or type your ad on a plain piece of paper and send it along with your subscription. Your phone will probably start ringing before you receive your first issue.

For MasterCard and VISA Subscriptions only,  
**CALL TOLL FREE 1-800-327-9920**

For MasterCard and VISA Classified Ad orders only,  
**CALL TOLL FREE 1-800-327-9926**

As you outgrow your system or want to trade up (most dealers won't take trade-ins), use Computer Shopper ads to sell your items to 20,000 readers nationwide for the low cost of 10 cents per word.



Start or add to your computer system by finding money saving bargains in each month's issue from individuals who no longer need their personal equipment.



If you need help with any computer related problem whether it's an interface problem or advice on the right peripheral for a homebrew system, use the free HELP column especially designed for that purpose.



You have the convenience of shopping nationwide without ever leaving your home or office. And if you buy out of state you'll save on sales tax.



You've got your computer hardware, but what about the software? Use a Computer Shopper ad to find what you need. Someone advertising in Computer Shopper probably has what you want.





# DISK III

## 100% Compatible

### Model III Disks

**Complete Business System includes:**  
**48K TRS-80™ Model III, Disk III™ 2 Drive System, TRSDOS and Manual.**



# \$1882

**DISK III Single drive assy' \$599.00**  
**DISK III Two drive assy 864.00**  
**DISK III Assy w/out drives 435.00**  
**TRSDOS™ & Manual 21.90**  
**External drives (3 & 4) 299.00**

DISK III single drive assembly includes: one 40 track 5 1/4" double density drive, power supply, controller, mounting hardware, and applicable cables.

### IMMEDIATE DELIVERY - COMPARE AND SAVE

#### WINCHESTER HARD DISK MODEL III

Integral Winchester Business system includes:  
 48K Model III, LDOS  
 Disk III™, 6.3 MEG  
 HARD DISK SYSTEM.

# \$4995

# \$2895

6.3 MEGABYTE WINCHESTER  
 HARD DISK SUBSYSTEM  
 With chassis, PS, LDOS™.  
 9.5 MEG \$3395.00

#### MOD III Options:

9.5 MEG HD (internal)	add \$500.00
80 tk 1 side floppy	add \$120.00
80 tk 2 side floppy	add \$240.00

#### Winchester Subsystem Options:

2 x 6.3 Meg drives	4495.00
2 x 9.5 Meg drives	5495.00

#### Peripherals

Epson MX-80	500.00
Epson MX-80 FT	615.00
Epson MX-100	800.00
Centronics 739	700.00
Starwriter 25 (P)	1395.00
RS-232	95.00
Lexicon modem	105.00

#### MODEL I/III

**EXTERNAL DRIVE \$275**  
**W/ PS & ENC**  
 Fully Compatible  
 120 day warranty  
 Easy installation  
 80 tk or 2 sided \$419.00  
 80 tk & 2 sided 549.00

#### OTHER PRODUCTS

SUPERBRAIN 64K	2990.00
PARALLEL PORT —	
SUPERBRAIN	99.95
DISK & MYSTERIES	22.50
BASIC & MYSTERIES	29.95
NEC Ribbons (min. 6)	5.95
Epson Ribbons	12.50

#### NEW—

LDOS Operating System	149.00
-----------------------	--------

#### COMING SOON!!

Internal MODEM for MOD III

IF YOU DON'T SEE IT ADVERTISED CALL US AND ASK FOR IT.

PUBLISHED PRICES REFLECT CASH DISCOUNT.

ALL PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE.

TRS-80 and TRSDOS are trademarks of Tandy Corp.

DISK III is a trademark of VR Data Corp. Dealership available.

## Phone toll free 800-345-8102

• in PA 215-461-5300    Cable address "VRDATA" • TELEX

# VR Data

VR Data Corporation

777 Henderson Boulevard • Folcroft, PA 19032





ers correspond to pin 1 on each of the two sockets; otherwise, you may damage your C1P.

There is one other thing I think I should mention. My Challenger came without the 8T28s plugged into the U6 and U7 sockets on the computer board. You will need these ICs or the parallel port board won't work.

### Testing

Fig. 8 shows a wiring diagram of a cable that can be used to verify that the port board is functioning properly. Once the cable has been made, label it as per the figure (*this is important*). Then connect the A side of the cable to the P1 out socket, noting the pin 1 alignment. Connect the B side of the cable to the P1 in socket, also noting the pin 1 alignment.

Type in the test program and run it. The program will output to output port 1, which will in turn input to input port 1 for verification. If the test fails, the program will print which bits are not working. Ports 2 and 3 can be checked by moving the cable between the appropriate port sockets (i.e., P2 in-P2 out, P3 in-P3 out) and running the program.

### Using the Board

To transfer data to an output port, simply use the basic POKE command

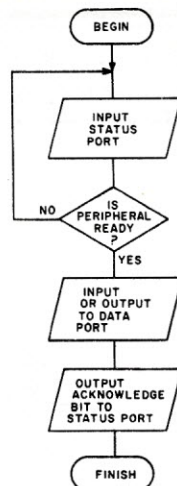


Fig. 9. I/O transfer flowchart.

just as you would if you were transferring data to a memory location. For instance, the command "POKE 63233,200" would transfer the binary equivalent of the decimal number 200 to output port 1, "POKE 63234,100" would transfer the binary equivalent of the decimal number 100 to output port 2, and so on.

Similarly, to transfer data from an input port to the data bus, use the PEEK command just as you would use the PEEK command to get data from a memory location.

To implement a working I/O trans-

fer situation, you may want to (or need to) use the input and output status ports to provide handshaking signals between the computer and the peripheral. The status port pins of Fig. 4 have been assigned control functions, although these assignments are arbitrary and could be changed at will.

Fig. 9 shows a flowchart of a typical input and output data transfer. The parallel ports you now have available to your microcomputer can open up a whole new world of applications. With its 24 input lines, 24 output lines and 12 status lines, your computer can begin to control and monitor the outside world. ■

```

100 PRINT "WHICH PORT DO YOU WANT TO TEST-1, 2, 3"
110 INPUT X: IF X#1 AND X#2 AND X#3 THEN 100
120 Y=63232+X
130 X=0
140 GOSUB 400
150 Z=1
160 GOSUB 400
170 Z=2
180 GOSUB 400
190 Z=4
200 GOSUB 400
210 Z=8
220 GOSUB 400
230 Z=16
240 GOSUB 400
250 Z=32
260 GOSUB 400
270 Z=64
280 GOSUB 400
290 PRINT: PRINT: PRINT "TEST COMPLETE"
300 GO TO 100
400 POKE Y, Z
410 A=PEEK (Y)
420 IF A#Z THEN GOSUB 500
430 RETURN
500 PRINT "PORT" X "FAILS"
510 PRINT "INPUT="Z "OUTPUT="A
520 RETURN
  
```

Test program.

### 9 TRACK TAPE DRIVES

800 BPI  
45 IPS  
FULL MANUAL  
\$4850 VALUE



**\$2400**  
NEW IN  
ORIGINAL  
BOXES

PERTEC Model 8840A-9-45  
INDUSTRY STANDARD INTERFACE  
CAPABLE OF IND. STD. ANSI-IBM DATA FORMAT

- READ/WRITE DATA IN STANDARD ANSI-IBM COMPATIBLE FORMAT
- DUMP WINCHESTERS AND HARD DISKS: 10 inch reels hold up to 3600' of tape - 34.56 Megabytes unblocked.
- EXCHANGE DATA & PROGRAMS WITH LARGE MAIN FRAMES AT SCHOOL, WORK, SERVICE BUREAUS ETC.
- BARGAIN PRICED MINI-COMPUTER UPGRADE. OEM List \$4850

A large OEM overstock makes these industry standard drives available at a fraction of their current list price. Full size drives handle up to 10.5 inch reels of standard inexpensive 1/2 inch mag tape. 19 inch rack mount or use right out of the box on steel shipping frame.

**SPECIFICATION SUMMARY:** 9-track, 800 BPI, dual head (read after write), 45 IPS read/write, 200 IPS rewind, BOT/EOT sensing, 110 VAC/60-Hz, solid state, recent manufacture, all I/O signals TTL/DTL compatible, tension arm tape buffering, full control panel. Call or write for full set of technical specifications.

**INTERFACES:** Electrovalue encourages the development of interfaces to popular systems. Interfaces exist for popular minis and are being developed for several hobby computers. If you'd like to develop and document an interface to a popular small system call to discuss discounts.

ELECTROVALUE INDUSTRIAL INC.  
P.O. BOX 157-K  
MORRIS PLAINS, NJ 07950  
Formerly Electrovalue Industrial



Phone reservations and questions are welcome.  
201/267-1117

Designed for your . . .

**TRS-80™**  
the **PHOTOPOINT™** Light Pen\*  
a whole NEW concept in  
computer application

- Just plugs into your TRS-80 with disk or without! (Does not void warranties.)
- Programs with 3 lines in Basic!
- Comes with two Programs
- Complete instructions!!
- Just point to play!
- Often eliminates confusing keyboard from games, education, or multiple choice.

All you need to get up and running the same day you receive your PhotoPoint is included.  
For only . . .

**\$19.95** Order NOW from  
MICRO MATRIX  
Complete P.O. Box 938  
Pacifica, CA 94044

\*Dealer inquiries welcomed!

✓ 134



---

*For those big boppers who tape music (or other material) from records, this Micropolis program offers several methods of balancing the timing of the tape.*

---

# Keep in Tune with the Times

By Joel Shapiro

**L**ike many music buffs, I like to transfer my prized records to tape before they show signs of wear.

The main problem isn't transferring the music, but doing so with a minimum amount of dead time on either end of the tape. The manual calculations required are usually more than I care to do, forcing me to accept a less professional recording than I want.

This program, written in Micropolis BASIC (version 4.0), is designed to make tape recording easier. It requires only a single-drive system, and, although I have a 48K memory, program capacity and size can be reduced for systems with less. You also need an 80-column printer.

Some of the program's features are as follows:

*It uses a disk file for record data.* All record data for both singles and albums is entered into a disk file, so you can get different mixes.

*All record and tape times are entered in minutes and seconds.* All time conversions are done within the program. Operator prompting and console messages are also in the same format.

*It has adjustable timing within the program.* The number of selections that can be entered can exceed the time available on the tape. Selections can then be deleted from the selection array and will not be considered in the time calculations. This in no way affects the data on disk, as that

remains unchanged.

*It can space between selections.* You can add up to ten seconds of space between each selection, which is considered in the calculations.

*It has three different methods of balancing.* This should suit both the type of music being recorded and your personal preferences.

*It prints a list of selections in balanced format.* The printed listing shows how each selection should be placed on the tape for balance within the criteria selected by the user. This will also double as a catalog sheet for use in a library function.

*It sorts output.* Whenever possible, the output report will show selections in album order for ease in recording.

Although written in Micropolis BASIC, many of the statements have similar functions provided by other BASICS, so conversion to yours should present few problems.

## The Program

The program is over 11K in length. This can be reduced by eliminating the REMARK (shown as ! in the listing) statements. You can further reduce the program size by decreasing the amount of text used in the prompts and error messages.

The arrays accommodate up to 60 selections; if available RAM becomes a problem, this can be reduced. Note that variable B% is set to 60 in line 110 of the program and is used for both a loop terminator and for the timing calculations. If you do decide to reduce the capacity, be sure you don't affect the calculations in lines 180 and 190.

Note the statements in lines 400

through 520. These provide the CLEAR SCREEN and VERTICAL CENTERING for my system and should be changed to accommodate yours. The USER DEFINED FUNCTION (FNA) in line 50 serves to center a line of text horizontally on the screen.

The STRING statement in the same line changes the string delimiter to ASC(255). The normal string delimiter in most BASICS is a comma, and if that is the case with yours, you'll have to be careful not to use a comma in any of the text entered into the program while in operation.

Micropolis BASIC uses fixed-length strings, and these must be defined in arrays. Note in line 100 that all string arrays dimensioned show two numbers within the parentheses. The first number is the number of elements in the array. The second is the maximum length of the string allowed in the array.

The subroutine in lines 200 through 220 requests a file name, searches for the file on both drives and opens it if found. If it can't be located, you will be asked if you wish to create one. Once the file is created, operation continues normally.

The subroutine in line 240 prints a line of periods matching the length of the text being requested, and serves to show the user how much text will be accepted in the string.

All program functions are selected from the main menu in lines 1500-1540, and all program functions will return to this menu upon completion.

## Adding Data to File

This function, which begins in line



1550, lets you add data to an existing or newly-created file. The first entry required determines whether an album or single selection is being entered. If an album is entered you'll be asked to enter a series of selections for each side. If it is a single, you'll be allowed only one selection per side.

Album titles are recorded on the disk, as are the selections. However, each is recorded in a different format so the system recognizes each of them. The coding is done in variable J\$, which can be broken down into five characters. The first two characters denote the album number, the next denotes the side and the last two denote the band or selection number.

An album title will show only the album number and 000. A single will show 00, A or B for the side and 01 for the selection. An album selection will show album number, side and selection number. Note that album numbers and selection numbers are determined by the system and are not entered by the user.

This may be a good time to explain the FMT statement used in this BA-

SIC. The statement is similar to a PRINT USING statement but can also be used in formatting data for use in the program or in the files. Referring to the FMT statement in line 1640, R% is formatted to the string "99." If R% was equal to 5, the resultant string after use of the FMT statement would be "05." This is because the FMT statement will replace each "9" in the string with a 0 unless a digit for that position is present in the variable (R%).

Since the FMT statement is used frequently throughout the program, it would be worthwhile to write a subroutine to duplicate the function if your BASIC doesn't have its equivalent.

In the input sequence the backslash will be used to terminate entry for each side of each album and also to terminate the entry sequence. There is nothing sacred in using a backslash for these operations. I use it only because it's handy.

Note that the record time is entered in minutes, (space), seconds format. This BASIC will accept either a com-

ma or a space between numerical entries. You may use a comma to delimit each number if yours requires you to do so.

After termination of the data entry sequence, a final record will be written into the file and the file closed. The final record is used to retain the album number of the last album entered so the number won't be duplicated if you make additional entries.

## Performing Calculations

With this function, the file will be accessed and read into memory; the console will show how many entries are in the file and their timing. Note that the timing shown per side is just the total time divided by two and is to be used only as a guide in planning your recording.

It is in lines 1770-1790 that the file is read, album titles are separated from selections and both types of data are stored in their proper arrays. Line 1810 requests that you add up to ten seconds of allowance between selections, and line 1820 adds that into the timing array.

### Program Listing. Tape recording program in Micropolis BASIC.

```

10 ! TAPEREC
20 ! RECORD TO TAPE RECORDING CALCULATOR
30 ! BY JOEL SHAPIRO - BONJOEL ENTERPRISES
35 ! (C) 1981 BONJOEL ENTERPRISES
40 !
50 DEFFNA(X$)=40-INT(LEN(X$)*.5):STRINGCHAR$(255):Y$=CHAR$(255)
100 DIMB$(20,5),D$(20,40),G$(20,40),J$(60,5),C$(60,40),R$(60,40),A$(100),MZ(60),CZ(60),NZ(60),HZ(60)
110 B$="":Z$="9999":BZ=60:T=20
120 GOTO1510
170 ! CALCULATE MINUTES AND SECONDS
180 M=MZ\BZ:S=MOD(MZ,BZ):RETURN
190 M=MZ(I)\BZ:S=MOD(MZ(I),BZ):RETURN
200 ! ACCESS FILE
202 IFN$<>"GOSUB410:PRINTTAB(T)"Same File: ";RIGHT$(N$,LEN(N$)-2):GOSUB560:IFA$="Y"N$=RIGHT$(N$,LEN(N$)-2):GOTO206
203 GOSUB410:PRINTTAB(T)"Enter Name of File or \ to Exit Routine"
204 PRINT:PRINTTAB(T):INPUTN$:IFN$=B$GOTO1510
206 FORN=0TO1:A$=MID$(STR$(N),2,1):OPENIA$+":"+N$ERROR210
208 N$=A$+":"+N$:F=ATTR(1):RETURN
210 IFERR=40ERR=7NEXTN:IFERR=7PRINTTAB(T)"Drive 1 not up - correct and":PRINTTAB(T):GOSUB550:GOTO206
211 IFERR=4GOTO214
212 PRINT:PRINTTAB(T)"DISK ERROR - ";ERR$;" - STOPPED":PRINTTAB(T)"Correct and ";GOSUB550:GOTO202
214 GOSUB410:PRINTTAB(T)"File cannot be found on Disk":PRINTTAB(T)"Do you wish to create a new file?":GOSUB560:IFA$="N"N$="":GOTO1510
216 A=0:PRINT:PRINTTAB(T)"Enter DRIVE NUMBER for new file":INPUTA:IFA<0ORA>1GOTO216
218 N$="":PRINT:PRINTTAB(T)"Enter NAME for new file":INPUTN$:N$="N":+FMT(A,"9:")+N$
220 OPENIN$=RIGHT$(N$,LEN(N$)-2):RETURN
240 PRINT "REPEAT$(CHAR$(46),XZ):CHAR$(13):PRINTREPEAT$(CHAR$(32),T):RETURN
299 ! WRITE RECORD TO FILE
300 PUTIRECPUT(1);M;Y$+J$+Y$+C$+Y$+R$+Y$:RETURN
310 ! WRITE FINAL RECORD TO FILE
320 X$="":PUTIRECPUT(1);RZ;Y$+X$+Y$+X$+Y$+X$+Y$:ATTR(1)=F:CLOSE1:RETURN
400 ! CLEAR SCREEN
410 PRINTCHAR$(26)
420 ! SPACE DOWN 11 LINES
430 PRINTREPEAT$(CHAR$(13)+CHAR$(10),11):RETURN
510 ! CLEAR SCREEN - NO SPACE DOWN
520 PRINTCHAR$(26):RETURN
550 INPUT"Press RETURN When Ready ";A$:RETURN
560 INPUT " (Y or N) ";A$:IFA$<>"Y"AND A$<>"N"GOTO560
570 RETURN
600 ! CALCULATE MINUTES AND SECONDS FOR TOTAL TIME
610 GOSUB180:PRINTTAB(T)"Total Time = ";M;"Minutes,";S;"Seconds":PRINT:MZ(0)=MZ*.5:I=0:GOSUB190:PRINTTAB(T)"or ";M;"Minutes,";S;"Seconds per side of Tape":PRINT:RETURN
1500 ! MAIN ENTRY POINT
1510 GOSUB410:A$="TAPE RECORDING TIMING PROGRAM":PRINTTAB(FNA(A$)):A$:PRINT:PRINTTAB(T)"Functions Available":PRINT
1520 PRINTTAB(T)" 1) Add Data To File":PRINTTAB(T)" 2) Calculate Timings/Print Report":PRINTTAB(T)" 3) Write-Protect Disk File":PRINTTAB(T)" 4) Delete File From Disk":PRINTTAB(T)" 5) Terminate Program"
1530 AZ=0:PRINTTAB(T)"Select Function You Desire":INPUTAZ:IFAZ<1ORAZ>5GOTO1510
1540 DNAGOTO1560,1760,3340,3370,3520
1550 ! ADD DATA TO FILE
1560 GOSUB202:IFSIZE(1)>16GETIRECORDRECPUT(1)-1X,RZ,X$,X$,X$:PUTSEEK(1)=RECPUT(1)-1
1570 XZ=40:JZ=0:S$="A":GOSUB410:PRINTTAB(T)"Enter (A) Album, (S) Single or \ to End Data Entry":A$="":INPUTA$:IFA$<>"A"AND A$<>"S"AND A$<>"B"GOTO1570
1580 IFA$=B$GOSUB320:GOTO1510
1590 IFA$="S"GOTO1680
1600 JZ=1:GOSUB410:RZ=RZ+1:PRINTTAB(T)"Album Number";RZ:PRINT
1610 A$="":PRINTTAB(T)"Enter Album TITLE":PRINT:PRINTTAB(T):GOSUB240:INPUTA$:IFA$="GOTO1630
1620 C$=A$

```

More



Program listing continued.

```

1630 A$="":PRINT:PRINTTAB(T)"Enter Album ARTIST":PRINT:PRINTTAB(T);:GOSUB240:INPUTA$:IFA$="":GOTO1660
1640 R$=A$:M=0:J$=FMT(R$,"99")+000":GOSUB300:GOTO1680
1650 ! ENTRY POINT FOR START OF SIDE
1660 IFS$="B":GOTO1570
1670 IFS$="A":S$="B"
1680 GOSUB410:B=0:PRINTTAB(T)"Beginning of entry for side *S$:PRINTTAB(T)"Enter \ FOR TITLE when done with side":PRINT
1690 PRINTTAB(T)"Enter TITLE":PRINT:PRINTTAB(T);:GOSUB240:INPUTC$:IFC$=B$GOTO1660
1700 A$="":PRINT:PRINT"Last Artist Entered is *R$:PRINT:PRINT"Enter only a RETURN to use this Artist or Enter New Artist":PRINT:P
    RINTTAB(T);:GOSUB240:INPUTA$:IFA$="":GOTO1720
1710 R$=A$
1720 M=0:N=0:PRINT:PRINTTAB(T)"Enter TIME for this band (Minutes (Space) Seconds*":INPUTM,N:M=M*BZ+N:IFM=0GOTO1690
1730 TZ=RZ:IFJZ=0TZ=JZ
1740 B=B+1:J$=FMT(TZ,"99")+S$+FMT(B,"99"):GOSUB300:GOSUB410:GOTO1690
1750 ! CALCULATE TIMING
1760 GOSUB202:GOSUB410:IFSIZE(1)<PRINTTAB(T)"Nothing In File *":GOSUB550:ATRS(1)=F:CLOSE1:GOTO1760
1770 PRINTTAB(T)"Reading File Into Memory":SZ=1:MX=0:K=0:FORI=1TOSIZE(1)-1:GETICZ,M,J$,C$,R$:IFRIGHT$(J$,2)="00":K=K+1:B$(K)=J$:D$(
    K)=C$:G$(K)=R$:GOTO1790
1780 CZ(SZ)=C$:MZ(SZ)=M:HZ=MZ+M:J$(SZ)=J$:C$(SZ)=C$:R$(SZ)=R$:SZ=SZ+1
1790 NEXTI:SZ=SZ-1
1800 GOSUB410:PRINTTAB(T)SZ;"Bands/Titles in File":PRINT:GOSUB610:PRINTTAB(T);:GOSUB550
1810 D=0:GOSUB410:PRINTTAB(T)"Enter Time (up to 10 seconds) to be added to each band":PRINTTAB(T)"for allowance between tracks of
    record":PRINTTAB(T);:INPUTD:IFD>10GOTO1810
1820 FORK=1TOSZ:MX(K)=MX(K)+D:MX=MX+D:NEXTK
1830 GOSUB410:PRINTTAB(T)"New Timings is":PRINT:GOSUB610:PRINTTAB(T);:GOSUB550
1840 TZ=0:GOSUB410:PRINTTAB(T)"Enter Time For ONE SIDE of Tape (Minutes ONLY)":INPUTTZ:TZ=TZ*BZ:IFTZ=0GOTO1840
1850 GOSUB410:IFTZ>MX(0)GOTO1890
1860 PRINTTAB(T)"Tape is too short for records. Do you wish to delete":PRINTTAB(T)"some titles":GOSUB560:IFA$="Y":GOTO13170
1870 PRINT:PRINTTAB(T)"Do you wish to increase length of tape":GOSUB560:IFA$="Y":GOTO1840
1880 GOTO1510
1890 PRINTTAB(T)"Do you wish to delete selections":GOSUB560:IFA$="Y":GOTO13170
1900 ! CALCULATE RECORDINGS
1910 ! MENU FOR CALCULATION SELECTION
1920 GOSUB410:A$="TIMING BALANCE METHODS AVAILABLE":PRINTTAB(FNA(A$)):A$=PRINT
1930 PRINT" 1) BALANCE PER INPUT/ALBUM SEQUENCE - Fill side 1 of tape":PRINTTAB(4)"Balance on side 2 of tape":PRINT
1940 PRINT" 2) BALANCE PER INPUT/ALBUM SEQUENCE - Side 1 longer but":PRINTTAB(4)"balanced to side 2 - May have some leftover tape
    if timing is shorter":PRINTTAB(4)"than tape length":PRINT
1950 PRINT" 3) BALANCE REGARDLESS OF SEQUENCE - Closest balance possible":PRINTTAB(4)"Side 1 longer, each side in album order if
    possible":PRINT
1960 PRINTTAB(T)"Select Balance Method You Desire":AZ=0:INPUTAZ:IFAZ<10RAZ>3GOTO1920
1970 ONAZGOTO2040,2190,2400
1980 !
1990 ! C$(X), NZ(X) = CODE AND POINTERS FOR SIDE 1 OF TAPE
2000 !
2010 ! R$(X), HZ(X) = CODE AND POINTERS FOR SIDE 2 OF TAPE
2020 !
2030 ! BALANCE PER ALBUM SEQUENCE - FILL SIDE 1
2040 FX=0:GX=0:WZ=0:FORI=1TOSZ:IFWZ=0ANDFX+MZ(I)<=TZFX=FX+MZ(I):NEXTI:WZ=SZ:GOTO2100
2050 ! SET WZ TO START ELEMENT FOR SIDE 2
2060 IFWZ=0WZ=I
2070 ! ACCUM SIDE 1 IN FX, SIDE 2 IN GX
2080 GX=GX+MZ(I):NEXTI
2090 ! CHECK TO SEE WE'RE STILL ON THE TAPE
2100 IFGX>TZGOSUB410:DZ=MZ:MX=GX-TZ:GOSUB180:MX=DZ:PRINTTAB(T)"OVER TAPE LENGTH BY*M:MIN AND*S:SEC":PRINT:PRINTTAB(T);:GOSUB55
    0:GOTO13180
2110 FORI=1TOBZ:C$(I)="":R$(I)="":NZ(I)=0:HZ(I)=0:NEXTI
2120 ! PLACE SIDE 1 DATA IN C$(X) ARRAY, SIDE 2 IN R$(X) ARRAY
2130 J=WZ-1:FORI=1TOJ:IFLEFT$(J$(I),1)<>B$C$(I)=J$(I):NZ(I)=CZ(I)
2140 NEXTI:IFWZ=SZGOTO2170
2150 FORI=WZTOSZ:IFLEFT$(J$(I),1)<>B$R$(I-J)=J$(I):HZ(I-J)=CZ(I)
2160 NEXTI
2170 GOTO2930
2180 ! BALANCE SIDES - ALBUM SEQUENCE
2190 FX=0:GX=0:WZ=0:MX(0)=MZ*:5:FORI=1TOSZ:IFWZ=0ANDFX+MZ(I)<=MX(0)FX=FX+MZ(I):NEXTI:GOTO2260
2200 ! SET WZ TO START ELEMENT FOR SIDE 2
2210 IFWZ=0WZ=I
2220 ! ACCUM TIME FOR SIDE 2 IN GX, SIDE 1 IN FX
2230 GX=GX+MZ(I)
2240 NEXTI
2250 ! CHECK TO SEE THAT WE'RE STILL ON THE TAPE
2260 IFMAX(FX,GX)>TZGOSUB410:DZ=MZ:MX=MAX(FX,GX)-TZ:GOSUB180:MX=DZ:PRINTTAB(T)"OVER TAPE LENGTH BY*M:MIN AND*S:SEC":PRINT:PRIN
    TTAB(T);:GOSUB550:GOTO13180
2270 ! PLACE SIDE 1 DATA IN C$(X) ARRAY, SIDE 2 IN R$(X) ARRAY
2280 FORI=1TOBZ:C$(I)="":R$(I)="":NZ(I)=0:HZ(I)=0:NEXTI
2290 J=WZ-1:FORI=1TOJ:IFLEFT$(J$(I),1)<>B$C$(I)=J$(I):NZ(I)=CZ(I)
2300 NEXTI
2310 FORI=WZTOSZ:IFLEFT$(J$(I),1)<>B$R$(I-J)=J$(I):HZ(I-J)=CZ(I)
2320 NEXTI:IFFX>GXGOTO2380
2330 ! IF SIDE 2 IS LONGER, SWAPS SIDE 1 WITH SIDE 2
2340 GOSUB410:PRINTTAB(T)"Side 2 is longer than Side 1 by*GX-FX:seconds":PRINTTAB(T)"Do you wish to swap recordings now on Side
    2 with those"
2350 PRINTTAB(T)"on Side 1 so side 1 is longer":GOSUB560:IFA$="N":GOTO2380
2360 ! THIS LINE DOES THE SWAPPING
2370 FORI=1TOSZ:C$(I)=C$(I):NZ=NZ(I):C$(I)=R$(I):NZ(I)=HZ(I):R$(I)=C$(I):HZ(I)=NZ(NEXTI
2380 GOTO2930
2390 ! BALANCE REGARDLESS OF ANY SEQUENCE
2400 FORI=1TOBZ:C$(I)=Z$:R$(I)=Z$:NZ(I)=0:HZ(I)=0:NEXTI
2410 ! GET TIMING INTO ARRAY FOR MANIPULATION AND SORTING
2420 C=0:FORI=1TOSZ:IFLEFT$(J$(I),1)=B$GOTO2440
2430 C$(I)=FMT(MZ(I),Z$):C=C+MZ(I):NZ(I)=CZ(I)
2440 NEXTI:GOSUB3540
2450 ! FIND HIGH END OF ACTIVE INFORMATION
2460 FORI=1TOSZ:IFC$(I)=Z$Z=I-1:GOTO2490
2470 NEXTI
2480 ! SPLIT FOR SIDES OF TAPE, REFERENCE TO HALF OF TOTAL TIME
2490 HZ=I:Z=0:FORI=HZTOSTEP-1:IFC$(I)<>Z$ANDVAL(C$(I))+FX<*.5 R$(I)=C$(I):HZ(I)=NZ(I):C$(I)=Z$:NZ(I)=0:FX=FX+VAL(R$(I))
2500 NEXTI
2510 ! GET TOTAL TIME PER SIDE - P=ACCUM C$(X), Q=ACCUM R$(X)
2520 P=0:Q=0:FORI=1TOHZ:IFC$(I)<>Z$P=P+VAL(C$(I))
2530 IFR$(I)<>Z$Q=Q+VAL(R$(I))
2540 ! SET R FOR DIFFERENCE BETWEEN SIDES
2550 NEXTI:S=MAX(P,Q)-MIN(P,Q):IFS=RORP=QGOTO2660
2560 R=S:IFP<QGOTO2620
2570 ! P>Q COMPARE AND RESHUFFLE
2580 FORI=HZTOSTEP-1:IFVAL(C$(I))>RGOTO2600
2590 R$(I)=C$(I):HZ(I)=NZ(I):C$(I)=Z$:NZ(I)=0
2600 NEXTI:GOTO2520
2610 ! Q>P COMPARE AND RESHUFFLE
2620 FORI=HZTOSTEP-1:IFVAL(R$(I))>RGOTO2640
2630 C$(I)=R$(I):NZ(I)=HZ(I):R$(I)=Z$:HZ(I)=0
2640 NEXTI:GOTO2520
2650 ! CHECK TO SEE WE'RE STILL ON THE TAPE
2660 IFMIN(P,Q)<>0ANDMAX(P,Q)<=TZGOTO2710
2670 IFMIN(P,Q)=0PRINTTAB(T)"CANNOT BALANCE SIDES - MUST DELETE SELECTION":GOTO2690

```

More





Into Computers? Robotics?  
Want to get started?

Take 6 great books  
for \$ **2<sup>95</sup>**  
(values to \$102.70)

... and get one **FREE!**

All the latest info on software, hardware, applications, and theory at savings up to 75%. Plus, discounts on software, games, cassettes, disks ... and more!



Join now and get *Computerist's Handy Databook/Dictionary* ... **FREE!!** (List \$4.95)

## 7 very good reasons to try The Computer Book Club ...

- **Reduced Member Prices.** Save up to 75% on books sure to increase your know-how
- **Satisfaction Guaranteed.** All books returnable within 10 days without obligation
- **Club News Bulletins.** All about current selections—mains, alternates, extras—plus bonus offers. Comes 10 times a year with dozens of up-to-the-minute titles you can pick from
- **"Automatic Order."** Do nothing, and the Main selection will be shipped automatically! But ... if you want an Alternate—or no books at all—we'll follow the instructions you give on the reply form provided with every News Bulletin
- **Continuing Benefits.** Get a Dividend Certificate with every book purchased after fulfilling membership obligation, and qualify for discounts on many other volumes
- **Extra Bonuses.** Take advantage of added-value promotions, plus special discounts of software, games, and more
- **Exceptional Quality.** All books are first-rate publisher's editions, filled with up-to-the-minute info



## THE COMPUTER BOOK CLUB Blue Ridge Summit, PA 17214

Please accept my membership in The Computer Book Club and send the 6 volumes circled below, plus a free copy of *Computerist's Handy Databook/Dictionary*. I understand the cost of the books selected is \$2.95 (plus shipping/handling). If not satisfied, I may return the books within ten days without obligation and have my membership cancelled. I agree to purchase 4 or more books at reduced Club prices during the next 12 months, and may resign any time thereafter.

841 985 1055 1062 1070 1088 1095 1101  
1108 1111 1160 1169 1183 1187 1191 1195  
1203 1205 1209 1275 1277 1295 1330 1332

Name \_\_\_\_\_ Phone \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_  
State \_\_\_\_\_ Zip \_\_\_\_\_

(Valid for new members only. Foreign and Canada add 20%. Orders outside U.S. or Canada must be prepaid with international money orders in U.S. dollars) KL-1181



Program continued.

```

2680 DZ=MZ:MX=MAX(P,Q)-TZ:GOSUB180:MX=DZ:PRINTTAB(T)*OVER TAPE LENGTH BY:M*MIN AND:S*SECONDS*
2690 PRINT:PRINTTAB(T)*Restarting system by reading file.:PRINT:PRINTTAB(T):GOSUB550:CLOSE1:GOTO1760
2700 ! SORT BOTH ARRAYS
2710 GOSUB3540:GOSUB3640
2720 ! MOVE J$(X) DATA INTO C$ AND R$ ARRAYS
2730 FORI=1TOBZ:IFC$(I)=Z$(I)=""\":HX(I)=0:GOTO2760
2740 FORJ=1TOSZ:IFNZ(I)=CZ(J)C$(I)=J$(J):GOTO2760
2750 NEXTJ
2760 NEXTI
2770 FORI=1TOBZ:IFR$(I)=Z$(I)=""\":HX(I)=0:GOTO2800
2780 FORJ=1TOSZ:IFHZ(I)=CZ(J)R$(I)=J$(J):GOTO2800
2790 NEXTJ
2800 NEXTI
2810 ! SWAP IF SIDE 2 IS LONGER THAN SIDE 1
2820 IFP>GOTO2850
2830 FORI=1TOSZ:C$(I)=C$(I):NZ=NZ(I):C$(I)=R$(I):NZ(I)=HZ(I):R$(I)=C$(I):HZ(I)=NZ:NEXTI
2840 ! SORT BY ALBUM
2850 GOSUB3640:GOSUB3540
2860 ! REPLACE \ WITH BLANK
2870 FORI=1TOBZ:IFC$(I)=""\":C$(I)=""
2880 IFR$(I)=""\":R$(I)=""
2890 NEXTI
2900 ! EXIT TO PRINT ROUTINE
2910 GOTO2930
2920 ! PRINT ROUTINES
2930 X$="":GOSUB410:PRINTTAB(T)*Enter Title for Tape*:INPUTW$:OPEN9*P*PAGESIZE64ENDPAGE3100:GOSUB410:PRINTTAB(T)*Set up Printer
- Press RETURN When Ready*:INPUTA:GOSUB3120
2940 A=0:B=0:PUT9*Side One*:PUT9
2950 MZ=0:FORI=1TOSZ:IFNZ(I)=GOTO3010
2960 B=VAL(LEFT$(C$(I),2)):IFB<16GOTO2990
2970 IFB=AGOTO2990
2980 A=B:PUT9TAB(5)LEFT$(B$(A),2):TAB(8)D$(A):TAB(49)G$(A)
2990 GETIRECORDNZ(I)AZ,CZ,A$,C$,R$:MZ=MX+CZ+D:PUT9LEFT$(C$(I),2):TAB(4)MID$(C$(I),3,1):TAB(8)RIGHT$(C$(I),2):TAB(13)C$:IFX$=R$PUT
9:GOTO3010
3000 PUT9* *R$:X$=R$
3010 NEXTI:MZ=MX-D:GOSUB180:PUT9TAB(10)*Total Time Side One = *FMT(M,"Z9:")FMT(S,"99"):PUT9REPEAT$(CHAR$(61),80)
3020 A=0:B=0:PUT9*Side Two*:PUT9
3030 MZ=0:FORI=1TOSZ:IFHZ(I)=GOTO3090
3040 B=VAL(LEFT$(R$(I),2)):IFB<16GOTO3070
3050 IFB=AGOTO3070
3060 A=B:PUT9TAB(5)LEFT$(B$(A),2):TAB(8)D$(A):TAB(49)G$(A)
3070 GETIRECORDHZ(I)AZ,CZ,A$,C$,R$:MX=MX+CZ+D:PUT9LEFT$(R$(I),2):TAB(4)MID$(R$(I),3,1):TAB(8)RIGHT$(R$(I),2):TAB(13)C$:IFX$=R$PUT
9:GOTO3090
3080 PUT9* *R$:X$=R$
3090 NEXTI:MZ=MX-D:GOSUB180:PUT9TAB(10)*Total Time Side Two = *FMT(M,"Z9:")FMT(S,"99"):PUT9REPEAT$(CHAR$(61),80):ENDPAGE9:PUT9:P
UT9:CLOSE9:ATTRS(1)=F:CLOSE1:GOTO1510
3100 PUT9:PUT9
3110 CLOSE9:OPEN9*P*PAGESIZE64ENDPAGE3100
3120 PUT9:PUT9
3130 PUT9*Tape Title: *W$:TAB(55)*Tape Time: *FMT(TZ\BZ,"ZZ:")* Minutes*:PUT9
3140 PUT9*A1*:TAB(4)*S*:TAB(7)*Band*:TAB(31)*Title*:PUT9REPEAT$(CHAR$(61),80)
3150 RETURN
3160 ! DELETION ROUTINE
3170 GOSUB410:A$="Delete Titles From Array":PRINTTAB(FNA(A$)):A$:PRINT:VZ=0
3180 PRINTTAB(T)*All titles will be displayed. You may select*:PRINTTAB(T)*to retain or delete any title*:PRINT:PRINTTAB(T):GOSUB5
50
3190 FORIX=1TOSZ:IFLEFT$(J$(IX),1)=B$GOTO3310
3200 GOSUB410:PRINTTAB(T)*Timing is*:PRINT:GOSUB610:PRINT:IFMX>TZ*2DZ=MX:MX=MX-(TZ*2):GOSUB180:PRINTTAB(T)*Delete*M*:Minutes,*S:
Seconds or more*:PRINT:MZ=DZ
3210 DZ=MX:MX=MX-IX:GOSUB180:MX=DZ:PRINTTAB(T)*Selection: *TAB(T+12)C$(IX):PRINTTAB(T)*Artist: *TAB(T+12)R$(IX):PRINTTAB(T)*Tim
e*:TAB(T+12)FMT(M,"Z9:")FMT(S,"99"):PRINT
3220 PRINT*Enter (D) to Delete, <CR> to Retain, (N) to End Delete Routine*:PRINT*or (*) to Restart list from the beginning.*:
3230 A$="":INPUTA$:IFA$="GOTO3310
3240 IFA$=B$GOTO3320
3250 IFA$=CHAR$(42)GOTO3180
3260 IFA$<>"D"GOTO3200
3270 J$(IX)=B$+RIGHT$(J$(IX),4):VZ=VZ+1:MX=MX-MZ(IX):MX(IX)=0
3280 ! MZ=TOTAL TIME
3290 ! MZ(0)=TOTAL TIME *.5
3300 ! TZ=TIME PER SIDE OF TAPE
3310 NEXTIX:GOTO3190
3320 GOTO1920
3330 ! CHANGE FILE ATTRIBUTES TO PERMANENT
3340 GOSUB202:GOSUB410:PRINTTAB(T)*Changing File Attributes to WRITE PROTECT - PERMANENT*
3350 ATTRS(1)=3:CLOSE1:GOTO1510
3360 ! DELETE FILE FROM DISK
3370 GOSUB202:IFF=3GOSUB410:PRINTTAB(T)*PERMANENT FILE - ERASE*:GOSUB560:IFA$="N"CLOSE1:GOTO1510
3380 GOSUB410:PRINTTAB(T)*ERASING FILE - *RIGHT$(N$,LEN(N$)-2):ATTRS(1)=0:CLOSE1:SCRATCHN$:GOTO1510
3390 ! VARIABLES USED IN INPUT ROUTINE AND FILES
3400 ! JZ=0 FOR SINGLE, 1 FOR ALBUM
3410 ! RZ=ALBUM NUMBER
3420 ! C$=ALBUM TITLE
3430 ! S$=SIDE - A OR B
3440 ! R$=ARTIST
3450 ! BZ=BAND NUMBER
3460 ! M=TIME FOR BAND (IN SECONDS)
3470 ! D=SECONDS ADDED FOR TIME BETWEEN TRACKS
3480 ! FILE STRUCTURE - DATA RECORD
3490 ! RECORD#, TIME, CODE, TITLE, ARTIST
3500 ! FILE STRUCTURE - FINAL RECORD
3510 ! RECORD#, ALBUM#, DUMMY, DUMMY, DUMMY
3520 GOSUB410:A$="Program Terminated":PRINTTAB(FNA(A$)):A$:PRINT:PRINT:END
3530 ! SORT FOR C$(X) AND NZ(X)
3540 L0=(BZ-AZ)+1
3550 L0=INT(L0/2)
3560 IFL0=0RETURN
3570 F0=BZ-L0:FORD0=AZTOF0:E0=D0+L0
3580 IFC$(D0)<C$(E0)GOTO3620
3590 F$=C$(E0):H0=NZ(E0):G0=D0
3600 C$(E0)=C$(G0):NZ(E0)=NZ(G0):E0=G0:G0=G0-L0:IFG0>AZ-1THENIFC$(G0)>F$GOTO3600
3610 C$(E0)=F$:NZ(E0)=H0
3620 NEXTD0:GOTO3550
3630 ! SORT FOR R$(X) AND HZ(X)
3640 L0=(BZ-AZ)+1
3650 L0=INT(L0/2)
3660 IFL0=0RETURN
3670 F0=BZ-L0:FORD0=AZTOF0:E0=D0+L0
3680 IFR$(D0)<R$(E0)GOTO3720
3690 F$=R$(E0):H0=HZ(E0):G0=D0
3700 R$(E0)=R$(G0):HZ(E0)=HZ(G0):E0=G0:G0=G0-L0:IFG0>AZ-1THENIFR$(G0)>F$GOTO3700
3710 R$(E0)=F$:HZ(E0)=H0
3720 NEXTD0:GOTO3650

```



Line 1840 requests the time for one side of the tape you're going to use and measures the total record time against this figure. If the total record time is longer you may elect to increase the tape time or delete some of the selections. You may also choose to delete entries even though you're within the tape time limitation.

The deletion routine in lines 3160-3320 is easy to understand in that it presents each selection on the console in the order of entry and lets you retain or delete any of them. The time shown as that necessary for deletion is based only on the assumption that all remaining selections will fit on the tape. This is usually a false assumption and you'll probably have to delete one or two more to have it fit. The correct total recording time is entirely dependent on the number of remaining entries, the time of each entry and the method of balancing you choose.

Three methods of balancing are provided, each with its own balancing routine. One thing common between them is at this point the coded record data is in the C\$(X) array and the disk file record pointers in the N%(X) array. After balancing, the C\$(X)-N%(X) pair will hold those for side one of the tape and the R\$(X)-H%(X) pair will hold the data for side two.

Method one (see Sample 1) attempts to fill side one of the tape with as many complete selections as possible, leaving the remaining selections for side two. This is done without altering the sequence of the selections from their original entry sequence, except for the deletions, which are not considered in this balance.

The loop in lines 2040-2080 accumulates the time for each selection in variable F% until such time that it may exceed the length for one side of the tape (T%). At that time subsequent passes will accumulate time in G%. W% becomes the pointer for the starting element for side two. After checking that the total time per side is still within the tape time (line 2100), the selections for each side of the tape are placed into the proper arrays, using the routine in lines 2120-2160. Operation is then transferred to the print routine in line 2930.

Method two (Sample 2) attempts to balance the time on each side without losing the original sequence of the selections. This will result in side one being longer than side two, but with the minimum amount of dead space at

the end of side one and the beginning (or end) of side two. This will allow you to splice off the end of the tape for a more professional recording.

The routine in lines 2180-2380 does the balancing and operates in a similar fashion to method one. The main difference is that the time for side one is compared to half the total recording time instead of half the total tape time. This will result in the closest balance possible without altering the sequence.

As it's possible for side two to be longer than side one using this method, the routine in lines 2330-2370 provides an elective means of swapping the selections from side one

with those of side two.

Method three (Sample 3) uses the routines in lines 2390-2910 and the sort subroutines in lines 3530-3720. This routine will give you the best possible time balance between both sides of the tape at the expense of changing the sequence of the selections. Since much sorting and data manipulation is required, this tends to be the method taking longest to complete its task.

This method differs from those preceding in that it uses the individual recording times for each selection instead of accumulated time to perform its balance. For this reason, the routine in lines 2410-2440 is used to

```

A1 S Band                               Title
=====
Side One

01 SARAH VAUGHAN, RECORDED LIVE - VOL 1 SARAH VAUGHAN
01 A 01 SEPTEMBER IN THE RAIN SARAH VAUGHAN
01 A 02 JUST ONE OF THOSE THINGS
01 A 03 BE ANYTHING (BUT BE MINE)
01 A 05 STAIRWAY TO THE STARS
01 B 01 LIKE SOMEONE IN LOVE
01 B 02 SPEAK LOW
01 B 04 I'LL STRING ALONG WITH YOU
02 SARAH VAUGHAN, RECORDED LIVE - VOL 2 SARAH VAUGHAN
02 A 01 THANKS FOR THE MEMORY
02 A 03 MISTY
02 A 04 WHAT IS THIS THING CALLED LOVE
Total Time Side One = 44:28
=====
Side Two

02 SARAH VAUGHAN, RECORDED LIVE - VOL 2 SARAH VAUGHAN
02 A 05 LOVER MAN
02 B 01 SOMETIMES I'M HAPPY
02 B 02 SASSY'S BLUES
02 B 03 POLKA DOTS AND MOONBEAMS
02 B 04 I CRIED FOR YOU
00 A 01 NIGHT TRAIN EARL BOSTIC
Total Time Side Two = 26:05
=====

```

Sample 1. Entering recordings onto tape (method 1).

```

A1 S Band                               Title
=====
Side One

02 SARAH VAUGHAN, RECORDED LIVE - VOL 2 SARAH VAUGHAN
02 A 01 THANKS FOR THE MEMORY SARAH VAUGHAN
02 A 02 I FEEL PRETTY
02 A 03 MISTY
02 A 04 WHAT IS THIS THING CALLED LOVE
02 A 05 LOVER MAN
02 B 01 SOMETIMES I'M HAPPY
02 B 02 SASSY'S BLUES
02 B 03 POLKA DOTS AND MOONBEAMS
02 B 04 I CRIED FOR YOU
00 A 01 NIGHT TRAIN EARL BOSTIC
Total Time Side One = 43:46
=====
Side Two

01 SARAH VAUGHAN, RECORDED LIVE - VOL 1 SARAH VAUGHAN
01 A 01 SEPTEMBER IN THE RAIN SARAH VAUGHAN
01 A 02 JUST ONE OF THOSE THINGS
01 A 03 BE ANYTHING (BUT BE MINE)
01 A 04 THOU SWELL
01 A 05 STAIRWAY TO THE STARS
01 A 06 HOW HIGH THE MOON
01 B 01 LIKE SOMEONE IN LOVE
01 B 02 SPEAK LOW
01 B 03 THREE LITTLE WORDS
01 B 04 I'LL STRING ALONG WITH YOU
01 B 05 ALL OF YOU
Total Time Side Two = 42:53
=====

```

Sample 2. Method 2.



move the timing data into the C\$(X)-N\$(X) pair for processing.

Once the arrays are loaded, operation is transferred to the sort subroutine in lines 3530-3620, and the C\$(X) array is sorted in ascending order. Since the deleted entries are now clustered at the high end of the array, the loop in lines 2450-2470 can set H% as the pointer for the highest active array element.

The loop in lines 2480-2500 approximates half the total recording time with some selections and moves the remaining selections into the R\$(X)-H\$(X) pair. The reentrant routine in lines 2510-2560 calculates the total time per side and determines the longest side and the time differential. The time difference is retained in variable R.

Depending upon which side is the longest, operation will transfer to routines in lines 2570-2600 or 2610-2640. These routines will try to find elements of both arrays they can swap that will result in a smaller time differential. The routine in line 2520 is reentered until variable R can no longer be reduced with additional swapping or an exact balance is achieved.

Lines 2650-2690 check for timing errors, and if they exist, the file must be read again and the process repeated. This is because the C\$(X) array no longer has the data required for the deletion routine or for method one or two operation.

Once these tests have been passed,

the arrays are sorted so any open elements freed by the swapping operation will once again appear in the highest array elements. Lines 2720-2800 move the proper data back into the arrays. Note that three backslashes (\ \ \) replace the data for those entries that are not included on the tape. This is done so the entries will sort properly when called in line 2850. The backslashes will be replaced with a single blank in lines 2860-2890.

If side one is shorter than side two, the records will be swapped as in method two; however, this will be done automatically since there is no need for an operator decision when using this method.

### Printing the Report

The print routine in lines 2920-3150 is straightforward and shouldn't be too hard to convert to other BASICs. After printing the heading, all data pertaining to side one of the tape is printed first, followed by the data for side two. The total time for each side is also printed. The resultant report will become your guide for the recording operation and can be retained for your tape catalog.

The total time per side includes the time (space) you elected to use between selections and will not agree with the total of the individual recording times as entered.

Worthy of note is that Micropolis BASIC allows you to define the printer or console as a file. Such is the case

in lines 2930 and 3110 where the printer is defined as file #9.\*

### File Attributes

Micropolis BASIC allows for setting and changing the write protect and erase protect features of any file within a program. This function, although nice to have, isn't required for the operation of the program. If your BASIC doesn't support such a function, all routines and references to them (ATTR and ATTRS) can be removed from the program without harm to its operation.

### Conversion Aids

To assist in converting this program to your BASIC, I offer the following definitions of some of the less common statements and keywords used in the program.

●ATTR—Returns the attributes of a file.

●ATTRS(X)—Sets the attributes of a file.

●ENDPAGE—A statement that gives BASIC a line number to GOSUB when the logical end of a page has been reached. Also pages to the end of the logical page when used as a statement.

●ERR, ERR\$ and ERROR—Error trapping and printing commands.

●GET—Read a record from a file.

●PAGESIZE—Sets the logical page size for print routines.

●PUT—Write a record to a file.

●PUTSEEK—Set the sequential record pointer for a file.

●RECORD—The random access record number for a GET or PUT.

●RECPUT—Returns the position of the sequential PUT pointer.

●REPEAT\$—Repeats a string n times.

●SIZE—Returns the number of records in a file.

The other keywords and statements should be familiar to those programming with extended disk BASIC, offering very few problems in the conversion.

### Operation

Since the program is fully prompted, it should not be hard to operate. Upon initialization the system will default to the file creation routine because the file will not be in existence on the disk. From that point on everything should be routine. Remember that nothing is ever deleted from the file so you don't need to reenter existing data when trying different mixes of music. ■

```

Al S Band                               Title
=====
Side One
01 SARAH VAUGHAN, RECORDED LIVE - VOL 1 SARAH VAUGHAN
01 A 01 SEPTEMBER IN THE RAIN SARAH VAUGHAN
01 A 02 JUST ONE OF THOSE THINGS
01 A 03 BE ANYTHING (BUT BE MINE)
01 A 04 THOU SWELL
01 A 06 HOW HIGH THE MOON
01 B 01 LIKE SOMEONE IN LOVE
01 B 03 THREE LITTLE WORDS
01 B 05 ALL OF YOU
02 SARAH VAUGHAN, RECORDED LIVE - VOL 2 SARAH VAUGHAN
02 A 02 I FEEL PRETTY
02 A 04 WHAT IS THIS THING CALLED LOVE
02 B 01 SOMETIMES I'M HAPPY
02 B 03 POLKA DOTS AND MOONBEAMS
02 B 04 I CRIED FOR YOU
Total Time Side One = 43:24
=====
Side Two
00 A 01 NIGHT TRAIN EARL BOSTIC
01 SARAH VAUGHAN, RECORDED LIVE - VOL 1 SARAH VAUGHAN
01 A 05 STAIRWAY TO THE STARS SARAH VAUGHAN
01 B 02 SPEAK LOW
01 B 04 I'LL STRING ALONG WITH YOU
02 SARAH VAUGHAN, RECORDED LIVE - VOL 2 SARAH VAUGHAN
02 A 01 THANKS FOR THE MEMORY
02 A 03 MISTY
02 A 05 LOVER MAN
02 B 02 SASSY'S BLUES
Total Time Side Two = 43:15
=====

```

Sample 3. Method 3.



# The most important book ever published for the Apple.

The most comprehensive description of Apple II firmware and hardware ever published — all in one place.

## What's Where in the Apple?

- Guides you — with a numerical Atlas and an alphabetical Gazetteer — to over **2,000** memory locations of **PEEKs**, **POKEs**, and **CALLs**.
- Gives names and locations of various **Monitor**, **DOS**, **Integer BASIC**, and **Applesoft** routines — and tells you what they're used for.
- Helps BASIC users to speed up their programs.
- Enables assembly language programmers to simplify coding and interfacing.

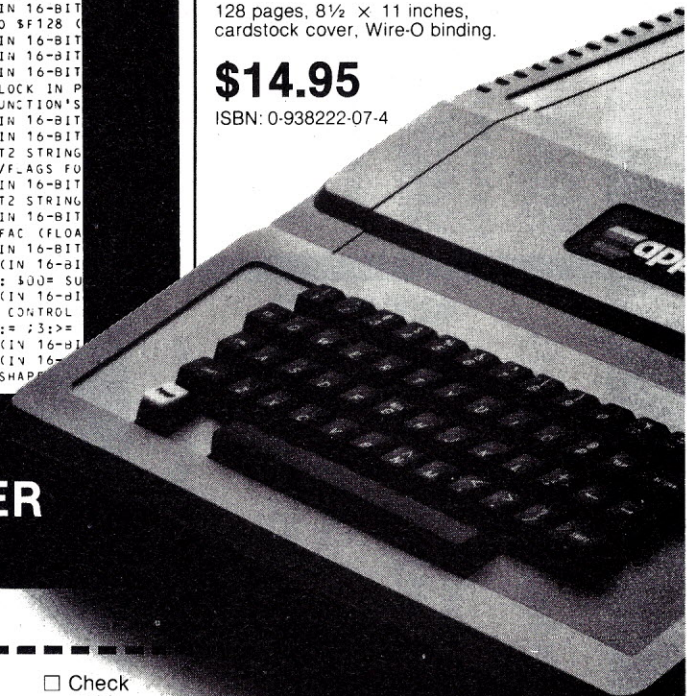
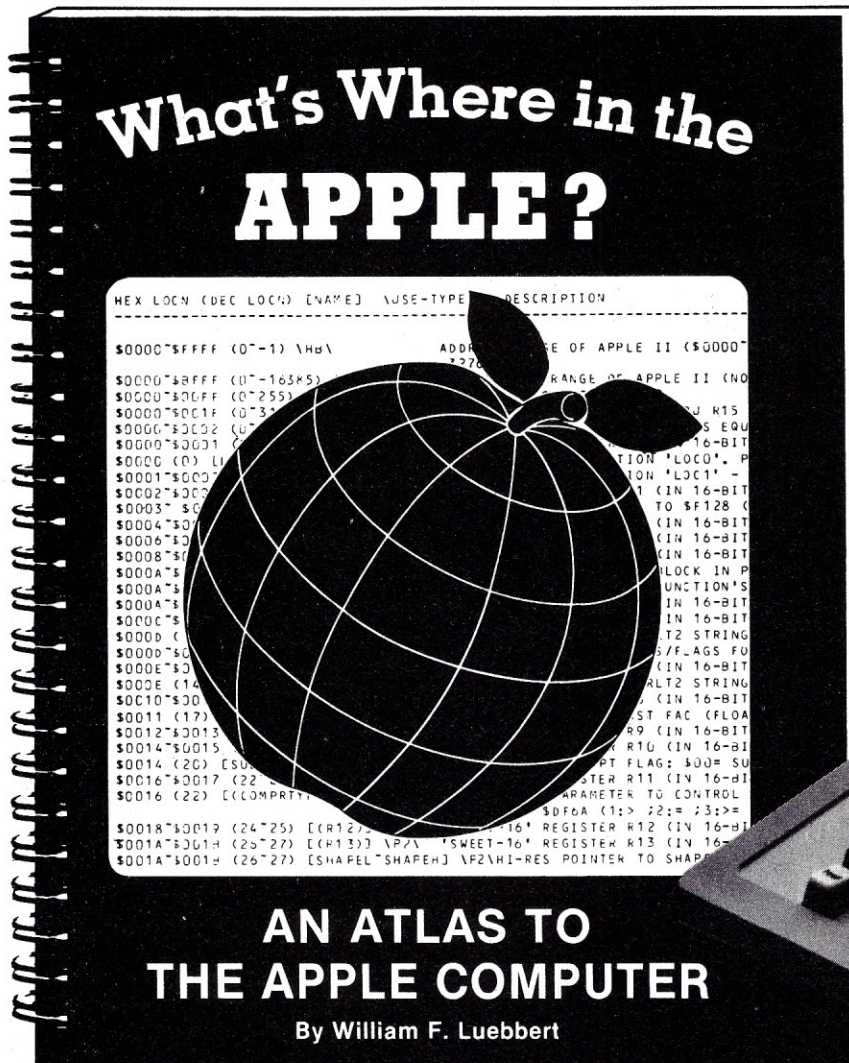
All Apple users will find this book helpful in understanding their machine, and essential for mastering it!

Ask for it at your computer store

128 pages, 8½ × 11 inches, cardstock cover, Wire-O binding.

**\$14.95**

ISBN: 0-938222-07-4



**ORDER TOLL-FREE TODAY** **800-227-1617** EXT. 564  
(in California 800-772-3545 Ext. 564)

Yes! Please send me \_\_\_\_\_ copies of *What's Where in the Apple?* at \$14.95 each (in U.S. plus shipping).

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_ Zip \_\_\_\_\_

**MICRO INK, Inc., 34 Chelmsford Street, P.O. Box 6502, Chelmsford, MA 01824**

☐ Check for \$ \_\_\_\_\_ enclosed. (Add \$2.00 surface shipping for each copy.) Massachusetts residents add 5% sales tax.

☐ VISA ☐ MasterCard

Acct. # \_\_\_\_\_ Expires \_\_\_\_\_

Signature \_\_\_\_\_



# 4K STATIC RAM 8/\$20.00

2114 LOW POWER 200 NS

## 74LS00

74LS00	.25	74LS123	.90	74LS259	2.80
74LS01	.25	74LS124	2.95	74LS260	.60
74LS02	.25	74LS125	.90	74LS261	2.45
74LS03	.25	74LS126	.80	74LS266	.50
74LS04	.25	74LS132	.75	74LS273	1.60
74LS05	.25	74LS136	.50	74LS275	3.30
74LS08	.30	74LS138	.75	74LS279	.50
74LS09	.25	74LS139	.75	74LS280	1.95
74LS10	.25	74LS145	1.10	74LS283	.95
74LS11	.30	74LS147	2.25	74LS290	1.20
74LS12	.30	74LS148	1.25	74LS293	1.80
74LS13	.40	74LS151	.75	74LS295	1.00
74LS14	.75	74LS153	.75	74LS298	.95
74LS15	.30	74LS155	.90	74LS299	2.50
74LS20	.25	74LS156	.90	74LS323	3.95
74LS21	.30	74LS157	.75	74LS324	1.75
74LS22	.25	74LS158	.75	74LS347	1.95
74LS26	.30	74LS160	.90	74LS348	1.95
74LS27	.35	74LS161	.90	74LS352	1.50
74LS28	.35	74LS162	.90	74LS353	1.50
74LS30	.25	74LS163	.90	74LS363	1.35
74LS32	.35	74LS164	.90	74LS365	.90
74LS35	.55	74LS165	.90	74LS366	.90
74LS37	.50	74LS166	2.00	74LS367	.65
74LS38	.35	74LS168	1.70	74LS368	.65
74LS40	.25	74LS169	1.70	74LS373	1.15
74LS42	.50	74LS170	1.70	74LS374	1.75
74LS47	.75	74LS173	.75	74LS375	.65
74LS48	.75	74LS174	.90	74LS377	1.40
74LS49	.75	74LS175	.90	74LS385	1.85
74LS51	.25	74LS181	2.10	74LS386	.60
74LS54	.35	74LS189	9.95	74LS390	1.85
74LS55	.35	74LS190	.95	74LS393	1.85
74LS63	1.20	74LS191	.95	74LS395	1.60
74LS73	.35	74LS192	.80	74LS399	1.65
74LS74	.40	74LS193	.90	74LS424	2.95
74LS75	.50	74LS194	.95	74LS447	.35
74LS76	.40	74LS195	.90	74LS490	1.90
74LS78	.50	74LS196	.80	74LS5630	75.00
74LS83	.75	74LS197	.80	74LS5640	3.00
74LS85	1.10	74LS221	1.15	74LS5641	3.00
74LS86	.40	74LS240	1.15	74LS5642	3.00
74LS90	.60	74LS241	1.15	74LS5645	3.00
74LS91	.80	74LS242	1.85	74LS5668	1.65
74LS92	.65	74LS243	1.85	74LS5669	1.85
74LS93	.60	74LS244	1.00	74LS5670	2.15
74LS95	.80	74LS245	1.95	74LS5674	9.60
74LS96	.80	74LS247	.75	74LS5682	3.15
74LS107	.40	74LS248	1.20	74LS5683	2.25
74LS109	.40	74LS249	.95	74LS5684	2.35
74LS112	.40	74LS251	1.25	74LS5685	2.35
74LS113	.40	74LS253	.80	74LS5688	2.35
74LS114	.50	74LS257	.80	74LS5689	2.35
74LS122	.45	74LS258	.80		

## 74S00

74S00	.40	74S163	3.70
74S02	.45	74S168	4.60
74S03	.45	74S169	5.40
74S04	.75	74S174	1.05
74S05	.75	74S175	1.05
74S08	.45	74S181	4.45
74S09	.75	74S182	2.90
74S10	.65	74S188	3.90
74S11	.80	74S189	14.90
74S15	.65	74S194	2.90
74S20	.65	74S195	1.85
74S22	.75	74S196	4.85
74S30	.45	74S197	4.20
74S32	.95	74S201	14.90
74S37	1.85	74S225	8.90
74S38	1.65	74S240	3.95
74S40	.40	74S241	3.70
74S51	.75	74S251	1.85
74S64	.75	74S253	7.40
74S65	1.20	74S257	1.35
74S74	.65	74S258	1.45
74S85	2.35	74S260	1.80
74S86	1.40	74S274	19.90
74S112	1.55	74S275	19.90
74S113	1.95	74S280	2.85
74S114	1.45	74S287	4.70
74S124	2.75	74S288	4.40
74S132	1.20	74S289	6.95
74S133	.95	74S301	6.90
74S134	.65	74S373	3.40
74S135	1.45	74S374	3.40
74S138	1.05	74S381	7.90
74S139	1.20	74S387	5.70
74S140	1.40	74S412	2.95
74S151	1.15	74S471	9.90
74S153	1.15	74S472	16.80
74S157	1.15	74S474	17.80
74S158	1.40	74S482	15.50
74S161	2.80	74S570	7.75
74S162	3.70	74S572	7.75

## 74C00 CMOS

74C00	.35	74C195	2.20
74C02	.35	74C221	2.20
74C04	.35	74C240	2.20
74C08	.35	74C244	2.20
74C10	.35	74C373	2.70
74C14	1.45	74C374	2.70
74C20	.35	74C901	.80
74C30	.35	74C902	.80
74C32	.50	74C903	.80
74C42	1.70	74C904	.80
74C48	2.05	74C905	10.90
74C73	.65	74C906	.90
74C74	.85	74C907	.90
74C76	1.90	74C908	2.00
74C83	1.90	74C909	2.70
74C86	.90	74C910	9.90
74C89	4.50	74C911	9.90
74C90	1.70	74C912	9.90
74C93	1.70	74C914	1.90
74C95	1.70	74C915	1.90
74C107	.95	74C917	2.70
74C150	.50	74C918	1.90
74C151	2.20	74C920	16.00
74C154	3.20	74C922	5.90
74C157	1.75	74C923	5.90
74C160	1.95	74C925	6.70
74C161	1.95	74C926	7.90
74C162	1.95	74C927	7.90
74C163	1.95	74C928	7.90
74C164	1.95	74C929	7.90
74C165	1.95	74C930	7.90
74C173	1.95	74C932	1.95
74C174	2.20	74C941	2.75
74C175	2.20	74C989	9.90
74C192	2.20	80C95	.85
74C193	2.20	80C96	.90
80C97	.90	88C30	3.95
82C19	4.95	88C29	3.95

800-426-2668

206-643-0792

## 4000CMOS

4000	.35	4040	.95	4501	.50
4001	.35	4041	.95	4502	.95
4002	.35	4042	.75	4503	.65
4006	.95	4043	.85	4505	8.95
4007	.35	4044	.85	4506	1.25
4008	.95	4046	.95	4507	.95
4009	.45	4047	.95	4508	1.95
4010	.45	4048	.75	4510	.95
4011	.35	4049	.55	4511	.95
4012	.35	4050	.55	4512	.95
4013	.45	4051	.95	4514	2.25
4014	.95	4052	.95	4515	2.25
4015	.95	4053	.95	4516	1.50
4016	.45	4055	2.75	4518	1.25
4017	.95	4056	2.75	4519	1.25
4018	.95	4059	9.95	4520	1.25
4019	.45	4060	1.25	4522	1.25
4020	.95	4066	.75	4526	1.25
4021	.95	4068	.40	4527	1.75
4022	.95	4069	.40	4528	1.25
4023	.35	4070	.40	4531	.95
4024	.75	4071	.30	4532	1.75
4025	.35	4072	.30	4539	1.75
4026	1.95	4073	.30	4543	1.95
4027	.65	4075	.30	4553	4.95
4028	.80	4076	.95	4555	.95
4029	.95	4078	.50	4556	.95
4030	.45	4081	.40	4558	2.25
4031	1.50	4082	.40	4568	5.95
4032	2.75	4085	.95	4581	1.95
4033	2.75	4086	.95	4582	1.95
4034	2.75	4093	.95	4584	.95
4035	.85	4094	3.95	4585	.95
4037	2.50	4099	1.75	4702	9.95

## LINEAR

7805CT	.85	LM301V	.75	LM567V	1.25
7812CT	.85	LM308V	.75	LM723	.50
7815CT	.95	LM309K	1.50	LM733	.95
		LM311V	.60	LM741V	.30
		LM317T	1.90	LM747	.75
7805KT	1.40	LM317K	3.75	LM748V	.60
7812KT	1.40	LM318N	1.50	LM1414	1.50
7815KT	1.40	LM323K	3.75	LM1458V	.65
78L05	.85	LM324N	.60	DS1488N	1.00
78L12	.85	LM337K	3.95	DS1489D	1.00
7905CT	.95	LM339	.75	LM1889	2.45
7912CT	.95	LM377	2.25	LM3900	.60
7915CT	1.15	LM380	1.25	LM3909	.90
		LM386V	1.25	LM3914	3.75
7905K	1.50			LM3915	3.75
7912K	1.50	LM555V	.40	LM3916	3.75
79L05	.75	LM556	.70	DS75451	.40
79L12	.75	LM565	.95	DS75452	.40
79L15	.75	LM566V	1.50	DS75453	.40

HANLEY ENGINEERING CORP  
13400 Northrup Way #20  
Bellevue, WA. 98005  
1-800-426-2668 1-206-643-0792

Include 3.00 for Ups Ground  
Include 4.00 for Ups Blue  
Include 4.00 for 1st Class Mail  
Washington State add 5.4% Sales Tax



# 16K Memory 8/\$16.00

4116 200NS

## 8200

8155	11.25
8185	29.95
8202	45.00
8205	3.95
8212	1.90
8214	3.85
8216	1.80
8224	2.50
8226	1.80
8228	4.90
8238	4.90
8243	4.50
8251A	5.45
8253	9.80
8255A - 5	5.20
8257 - 5	8.95
8259A	6.95
8271	60.00
8272	39.95
8275	29.95
8279 - 5	10.00
8282	6.60
8283	6.60
8284A	5.75
8286	6.60
8287	6.60
8288	25.00
8289	49.95
8755A	45.00

## Z80

Z80	6.70
Z80A	7.25
Z80B	19.00
Z80 PIO	6.00
Z80A IO	7.10
Z80B PIO	15.50
Z80 CTC	6.00
Z80A CTC	7.10
Z80B CTC	15.50
Z80 DMA	18.50
Z80A DMA	22.50
Z80 SIO / 0	18.50
Z80A SIO / 0	22.50
Z80 SIO / 1	18.50
Z80A SIO / 1	22.50
Z80 SIO / 2	18.50
Z80A SIO / 2	22.50

## 6800

3242	8.00
3480	9.00
6800	5.75
6802	11.00
6809	25.00
6810	3.50
6821	3.50
6840	9.00
6843	41.00
6845	22.00
6847	12.25
6850	3.50
6852	3.50
6875	7.00
6880	1.80
6882	4.70
6885	1.80
6888	1.80
6889	1.80
68488	12.50

## 6502

6502	7.90
6502A	10.00
6504	8.45
6504A	9.30
6512	9.20
6512A	10.00
6520	4.40
6521	6.15
6521A	6.70
6522	8.75
6522A	11.70
6532	11.25
6532A	12.40
6545 - 1	22.50
6545A - 1	28.55
6551	11.95
6551A	12.95

## CPU

8080A	3.95
8085AS	8.95
8085A-2	11.95
8086	99.95
8088	39.95
8748	30.00

CALL  
**HANLEY FIRST**  
**800-426-2668**  
**206-643-0792**

## AUGAT LOW PROFILE SOCKETS

These Are High Reliability Industry Standard Sockets

8PIN	208-AG29D	.10
14PIN	214-AG29D	.16
16PIN	216-AG29D	.18
18PIN	218-AG29D	.20
20PIN	220-AG29D	.22
22PIN	222-AG29D	.24
24PIN	224-AG29D	.26
28PIN	228-AG29D	.28
40PIN	240-AG29D	.42

## 4K x 1 STATIC RAM

MOTOROLA MCM6641-20  
4044-200NS EQUIV.

**\$4.50**

4164

64 x 1

200 NS

**\$20.00**

## SOLID STATE SCIENTIFIC

256 x 4 CMOS RAM 450NS  
SCM5101E-1

**\$3.75**

## HITACHI

2K x 8 CMOS RAM 150NS

Pin Compatible with 2716

HM6116P-3 **\$19.00**

4118

STATIC RAM

1K x 8 **\$15.00**

## EPROMS

2708	AMD	3 Supply	450NS	3.50
2716	Hitachi	+5	450NS	7.00
2716	National	+5	450NS	7.00
2716	Intel	+5	450NS	7.00
2716-1	Intel	+5	350NS	9.50
2716	T.I.	3 Supply	450NS	7.50
2716	Motorola	3 Supply	450NS	7.50
2732	NEC	+5	450NS	16.00
2732	Mitsubish	+5	450NS	16.00
2732	Intel	+5	450NS	17.00
2732A	Intel	+5	450NS	17.00
2732A-3	Intel	+5	300NS	16.00
2732A-2	Intel	+5	200NS	20.00
2532	Hitachi	+5	450NS	18.00



## HANLEY ENGINEERING CORP

13400 Northrup Way #20

Bellevue, WA. 98005

1-800-426-2668

1-206-643-0792

Include 3.00 for Ups Ground

Include 4.00 for Ups Blue

Include 4.00 for 1st Class Mail

Washington State add 5.4% Sales Tax

Prices subject to change without notice. We reserve the right to substitute manufacturers.



# Sorting Techniques Explained

By H.S. Gentry

If you write software for any type of computer, sooner or later you'll need to sort data. Some sorting techniques are better than others, but why? When do you use the various techniques? Is any one technique good enough to use as your standard sorting algorithm? Here's a rundown of the different kinds of sorting, and their applications.

## The Bubble Sort

I learned the bubble sort technique first. It's called that because the elements that belong at the top of the list "bubble" up with each pass through the algorithm.

Using the bubble sort is simple. You go through the list  $n$  times ( $n$  is the number of items to be sorted), checking each item in the list with the next item and exchanging them if they aren't in the proper order. As you can see from Listing 1, this makes a very compact sorting program. Lines 1000-2000 do the actual sorting.

You can also see that the algorithm will always make  $n$  squared compares ( $n$  items checked  $n$  times). Thus, even if your data is already sorted (or nearly so), it will still take a long time to finish.

This algorithm can be improved with the addition of a flag to check for one complete pass through the data with no exchanges. When this condition is detected the data is sorted, no matter if this is the first or  $n$ th pass.

Listing 2 is the same program changed to use this flag technique.

The bubble sort can be further modified to improve its performance, but there is another, better sorting algorithm.

## The Straight Insertion Sort

The straight insertion sort is almost as easy to implement as the bubble sort, and will almost always give fast-

er results. (The only exception is when the data to be sorted is already in sort.)

The straight insertion sort passes through the data one time, takes each element and looks back from its location to find where it belongs. For example, sort the following data in ascending order:

6 1 8 4 9 3

Start with the second item (1) and

```
10 DIM D(100)
15 REM - GENERATE 101 RANDOM NUMBERS TO BE SORTED
20 FOR I = 0 TO 100
30 D(I)=RND(0)
40 NEXT I
1000 REM THIS IS THE BUBBLE SORT
1010 FOR I = 0 TO 100
1020 FOR L = 0 TO 100-I
1030 IF D(L) > D(L+1) THEN W=D(L): D(L)=D(L+1): D(L+1)=W
1040 NEXT L
1050 NEXT I
2000 REM THIS IS THE END OF BUBBLE SORT
9999 END
```

Listing 1. Simple bubble sort.

```
10 DIM D(100)
15 GENERATE 101 RANDOM NUMBERS TO BE SORTED
20 FOR I = 0 TO 100
30 D(I)=RND(0)
40 NEXT I
1000 REM - THIS IS THE BUBBLE SORT WITH FLAG
1005 F=0
1010 FOR I = 0 TO 100
1020 FOR L = 0 TO 100-I
1030 IF D(L) > D(L+1) THEN W=D(L): D(L)=D(L+1): D(L+1)=W:F=1
1040 NEXT L
1050 IF F=0 THEN 2000 ELSE F=0: NEXT I
2000 THIS IS THE END OF BUBBLE SORT WITH FLAG
9999 END
```

Listing 2. Bubble sort with flag.



compare it to the first (6). If these two items are in order, go on to the next item. If they are not in order, which is the case here, then exchange them. We get:

1 6 8 4 9 3

Now move on to the third item (8). It's in order, so leave it alone and move on to the fourth (4). It's not in order; look back until you find the place it belongs. The result:

1 4 6 8 9 3

Repeat this for the last two items. You'll end up with:

1 3 4 6 8 9

Listing 3 is the straight insertion sort algorithm implemented in BASIC. Lines 1000-2000 are the actual sort. It's almost as easy as the bubble sort and much faster.

How much faster? The bubble sort algorithm with the flag took 210 seconds to sort 100 random numbers (on a TRS-80 Model I). It took 888 seconds to sort 200 random numbers. The straight insertion sort took 87 seconds to sort 100 numbers and 329 seconds to sort 200 numbers.

### Quicksort

Until recently I used one of the above techniques to do all of my sorting, and then I learned about quicksort.

Quicksort was invented by C. A. R. Hoare. Unlike the bubble or straight insertion sort, quicksort is not exactly intuitive. That is, if I tried to think of a way to sort data, the quicksort algorithm would not come to mind.

Quicksort works by selecting an item at random from the list to be sorted, and then partitioning the data into two groups. One group has elements greater than the selected element and one group has elements less than the selected element. These two partitions are then subjected to this same algorithm, as are the four resulting partitions, and so on until each partition has only one element. At this time the data will be in sort.

Let's look at a simple example. Sort the following data in ascending order:

6 1 8 4 9 3

First pick an element at random; e.g., 4. Then start at the low end and at the high end, and exchange elements that are on the wrong side. You get:

3 1 8 4 9 6

Then:

3 1 4 8 9 6

Now you have two partitions:

3 1 4 and 8 9 6

Work on the 314 partition. Pick 1 as the test element and you get 1 and 3 4

as the two partitions. Work on 3 4 to get 3 and 4 as the two partitions. You now have four partitions:

1, 3, 4, 8 9 6

You must go back to 8 9 6 and work to get 6 8 and 9. Then:

6, 8, 9

Put all of this together and you have:

1, 3, 4, 6, 8, 9

and the data is sorted.

The hard part is keeping track of all of the partitions that result from each pass and making sure that all of them are processed. This can be done in two ways.

The hardest way is used in a programming language that does not allow recursive calls to subroutines. That is, a subroutine may not call itself. In this case you must keep

```

10 DIM D(1000)
15 REM - GENERATE 1001 RANDOM NUMBERS TO BE SORTED
20 FOR I = 0 TO 1000
30 D(I)=RND(0)
40 NEXT I
1000 REM - THIS IS THE STRAIGHT INSERTION SORT
1100 FOR J = 1 TO 1000
1110 K=D(J)
1120 FOR L = J-1 TO 0 STEP -1
1130 IF K > D(L) THEN D(L+1)=K: GO TO 1200
1140 REM - WHEN WE GET HERE THE LAST SLOT WAS NOT THE PLACE
1141 REM - SO WE WILL MOVE UP ONE PLACE
1150 D(L+1)=D(L)
1160 NEXT L
1161 REM - THE ABOVE LOOP WILL BE REPEATED UNTIL A PLACE IS
1162 REM - FOUND OR THE LOOP RUNS OUT. IF THIS HAPPENS
1163 REM - THEN THE PROPER PLACE IS AT THE BEGINNING OF
1164 REM - THE LIST.
1180 D(0)=K
1200 NEXT J
2000 REM - THIS IS THE END OF STRAIGHT INSERTION SORT
9999 END

```

Listing 3. Straight insertion sort.

```

5 REM - SL IS THE ARRAY STACK FOR THE LEFT PARTITION BOUND
6 REM - SR IS THE ARRAY STACK FOR THE RIGHT PARTITION BOUND
7 REM - S IS THE POINTER TO THE NEXT POSITION IN THE STACKS
10 DIM D(1000),SL(20),SR(20)
15 REM - GENERATE 1001 RANDOM NUMBERS TO BE SORTED
20 FOR I = 0 TO 1000
30 D(I)=RND(0)
40 NEXT I
1000 REM - THIS IS NONRECURSIVE QUICKSORT
1004 REM - INITIALIZE THE STACKS WITH FIRST AND LAST TO START
1005 S=1: SL(1)=0: SR(1)=1000
1006 L=SL(S): R=SR(S): S=S+1
1007 REM - L=LEFT BOUND OF PARTITION TO BE PARTITIONED
1008 REM - R=RIGHT BOUND OF PARTITION TO BE PARTITIONED
1010 REM - NOW WE WILL PARTITION
1020 I=L: J=R
1030 X=D((I+J)/2)
1040 IF D(I) < X THEN I=I+1: GOTO 1040
1050 IF X < D(J) THEN J=J-1: GOTO 1050
1051 REM - THE LAST TWO LINES SELECTED AN ELEMENT IN THE
1052 REM - UPPER HALF THAT BELONGS IN THE LOWER AND IN THE
1053 REM - LOWER HALF THAT BELONGS IN THE UPPER
1056 IF I <= J THEN 1060 ELSE 1100
1060 W=D(I): D(I)=D(J): D(J)=W
1070 I=I+1: J=J-1
1100 IF I > J THEN 1110 ELSE 1040
1110 IF I < R THEN S=S+1: SL(S)=I: SR(S)=R
1111 REM - THE LAST LINE PUSHED A PARTITION REQUEST ON THE
1112 REM - STACK. NOW WE WORK ON THE OTHER ONE.
1120 R=J
1130 IF L >= R THEN 1140 ELSE 1020
1139 REM - NOW WE SEE IF ANY REQUESTS ARE ON THE STACK
1140 IF S = 0 THEN 2000 ELSE 1006
2000 REM - THIS IS THE END OF QUICKSORT
9999 END

```

Listing 4. Nonrecursive sort.



track of each partition and make sure it is sorted. This is done with a stack (actually, two stacks). When you finish with each pass through the algorithm, you put the pointers to the right-most partition on the stacks and process the left partition again. When you work your way to the left end of

the list, you pop a partition off the stack and start again. When no pointers remain on the stack, the data has been sorted.

When you pick the size for the stack, you must guess a little. If you're very lucky and the partitions split the data exactly in two every

time, the stack must be only  $\text{LOG}(n)$  ( $n$  is the number of items to be sorted). If you're not so lucky and each makes the right partition (the one placed on the stack) one element, then the stack must be  $n$  long. Both of these conditions are almost impossible, and I find that a stack of a little more than  $\text{LOG}(n)$  works well. That is, for 1000 items to be sorted, a stack of 20 is more than enough.

Listing 4 is the nonrecursive Quicksort algorithm implemented in BASIC. Lines 1000-2000 form the actual sorting algorithm. Lines 1010-1070 perform the partitioning of the data into two groups—one greater than  $X$  and one less than  $X$ .  $X$  was chosen as the middle value in the data, although almost any value will work (some texts use the median value). The partitioning takes place by starting at both ends of the data and exchanging elements that are on the wrong side of  $X$ . At the end of this operation,  $I$  and  $J$  point to the two partitions. One of these is placed on the stack while the other is processed.

Quicksort will sort 100 random numbers in 32 seconds (as opposed to 210 for the bubble sort and 87 for the straight insertion sort). Quicksort will sort 600 numbers in 206 seconds. Straight insertion sort took 2809 seconds (I did not run bubble sort on this number of items but it would have taken over 10,000 seconds). It sorted 1000 numbers in 375 seconds, while straight insertion sort would take over 7000 seconds. In fact, the straight insertion sort time will increase as the square of the number of elements, while quicksort will increase as  $n\text{LOG}(n)$ .

If you can implement Quicksort in a language like Pascal, which allows recursive calls to subroutines (or procedures), then the algorithm is greatly simplified. Listing 5 is the same algorithm written in Pascal using the recursive feature. You don't need to keep track of the partitions to be worked on since the sort procedure calls itself recursively until all partitions are done.

Quicksort may sound like the answer to a programmer's prayer; it's quick and not too complicated. But it does have a few problems. If the data to be sorted is already in sort, it is slower than the bubble sort (with flag) and the straight insertion sort. Also, if each time the algorithm selects a value for  $X$  it selects the largest value in the partition, Quicksort becomes very slow. Fortunately both of these conditions are not very likely.

```

PROCEDURE SORT (L,R: INTEGER);
  VAR I,J,X,W: INTEGER;
BEGIN I:=L; J:=R;
  X:= A[(L+R) DIV 2];
  REPEAT
    WHILE A[I]<X DO I:=I+1;
    WHILE X<A[J] DO J:=J-1;
    IF I<J THEN
      BEGIN W:=A[I];
        A[I]:=A[J];
        A[J]:=W;
        I:=I+1; J:=J-1;
      END
    UNTIL I>J;
    IF I<J THEN SORT(L,J);
    IF I<R THEN SORT(I,R);
  END;
END;

```

Listing 5. Recursive Quicksort written in Pascal.

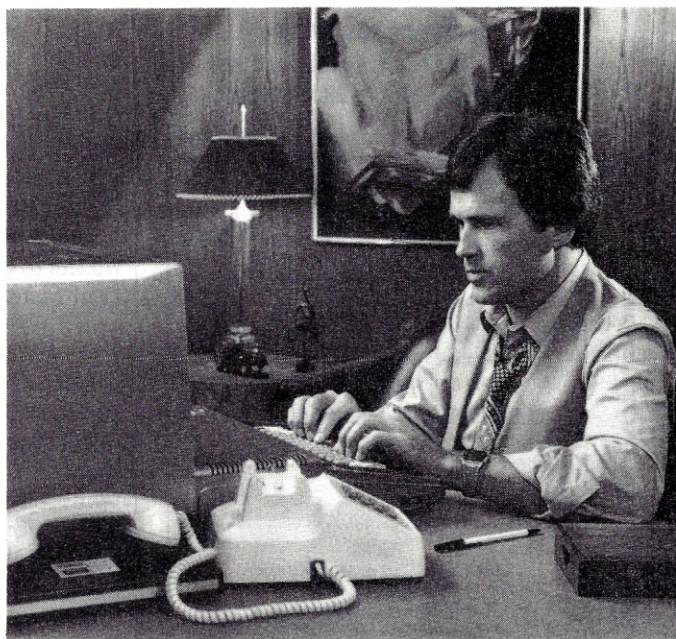
```

5 REM - SL IS THE ARRAY STACK FOR THE LEFT PARTITION BOUND
6 REM - SR IS THE ARRAY STACK FOR THE RIGHT PARTITION BOUND
7 REM - S IS THE POINTER TO THE NEXT POSITION IN THE STACKS
10 DIM D(1000),SL(20),SR(20)
15 REM - GENERATE 1001 RANDOM NUMBERS TO BE SORTED
20 FOR I = 0 TO 1000
30 D(I)=RND(0)
40 NEXT I
1000 REM - THIS IS NONRECURSIVE QUICKSORT
1004 REM - INITIALIZE THE STACKS WITH FIRST AND LAST TO START
1005 S=1: SL(1)=0: SR(1)=1000
1006 L=SL(S): R=SR(S): S=S-1 'POP TOP REQUEST FROM STACK
1007 REM - L=LEFT BOUND OF PARTITION TO BE PARTITIONED
1008 REM - R=RIGHT BOUND OF PARTITION TO BE PARTITIONED
1010 REM - NOW WE WILL PARTITION
1011 REM - BUT FIRST CHECK IF WE SHOULD USE SIS
1015 IF R-L < 22 THEN 3000 'IF WE HAVE 22 OR LESS USE SIS
1020 I=L: J=R
1030 X=D[(I+J)/2] 'SELECT MIDDLE VALUE
1040 IF D(I) < X THEN I=I+1: GOTO 1040
1050 IF X < D(J) THEN J=J-1: GOTO 1050
1051 REM - THE LAST TWO LINES SELECTED AN ELEMENT IN THE
1052 REM - UPPER HALF THAT BELONGS IN THE LOWER AND IN THE
1053 REM - LOWER HALF THAT BELONGS IN THE UPPER
1056 IF I <= J THEN 1060 ELSE 1100
1060 W=D(I): D(I)=D(J): D(J)=W 'EXCHANGE
1070 I=I+1: J=J-1
1100 IF I>J THEN 1110 ELSE 1040
1110 IF I < R THEN S=S+1: SL(S)=I: SR(S)=R
1111 REM - THE LAST LINE PUSHED A PARTITION REQUEST ON THE
1112 REM - STACK. NOW WE WORK ON THE OTHER ONE.
1120 R=J
1130 IF L >= R THEN 1140 ELSE 1020
1139 REM - NOW WE SEE IF ANY REQUESTS ARE ON THE STACK
1140 IF S = 0 THEN 2000 ELSE 1006
2000 END 'QUICKSORT/SIS IS FINISHED
3000 FOR J = L+1 TO R
3010 K=D(J)
3020 FOR L1 = J-1 TO L STEP -1
3030 IF K > D(L1) THEN D(L1+1)=K: GOTO 3200
3050 D(L1+1)=D(L1)
3060 NEXT L1
3080 D(L1)=K
3200 NEXT J
3210 GOTO 1140
9999 END

```

Listing 6. Quicksort and straight insertion sort.





## Jason McDonald has a competitive edge on the market, right in his own home.

You can have all the financial information you could only get from your broker, right on your home TV screen. How? With a low cost terminal or microcomputer and CompuServe's **financial services**.

We have a data base that is now serving thousands of customers throughout the United States with the very latest information on stocks, commodities, bonds and most of the name business and financial publication sources required to keep abreast of today's competitive markets.

Just look at the financial information that's available through the CompuServe Information Service network. At home. On your TV screen.

**MicroQuote:** current and historical data on more than 40,000+ stocks, bonds and options. Includes volumes, dividends, earnings per share, ratings and shares outstanding. The information is updated daily.

**Commodity News Service:** pricing, news and commentary on energy, metals, financial instruments and agricultural commodities. Also weather, agricultural and economic news.

**Standard & Poor's General Information File:** selected items of information from S&P's NYSE, ASE, and OTC Stock Reports on over 3,000 corporations.

**Financial pages of major regional newspapers:** electronic editions of major daily newspapers including The Washington Post, The New York Times, The San Francisco Chronicle, plus the AP financial wire.

**Raylux Financial Advisory Service:** business outlook, financial commentary, stock market outlook, securities glossary and industrial outlook model.

**Value Line Data Base II:** CompuServe provides access to fundamental financial information on more than 1,700 public companies.

**Fintol:** personal financial programs.

### How much does it cost?

The basic charge is \$5.00 an hour from 6 PM to 5 AM local time weekdays, and all day weekends—billed in minutes to your

charge card. MicroQuote, Standard & Poor's and Value Line are extra cost options. You can access the CompuServe Information Service with a local phone hook-up from more than 260 U.S. cities. For hardware you need a terminal or personal computer and a modem.

### There's more.

Along with the financial services, you get all the rest of the CompuServe Information Services: AP news and sports wires, electronic editions of major daily newspapers, games, electronic encyclopedia, government publication data, travel information, valuable consumer and home-related information, entertainment features, electronic mail, nationwide bulletin board, newsletters from computer manufacturers—and more!

When your broker's not available, we are. CompuServe's Information Service can give you a competitive edge. Get a demonstration of the CompuServe Information Service at a Radio Shack® Computer Center or many Radio Shack® Outlets. Or for more information write "Financial Information" at the address below.

# CompuServe

Information Service Division ✓ 147  
5000 Arlington Centre Blvd.  
Columbus, Ohio 43220  
(614) 457-8600

Radio Shack is a trademark  
of Tandy Corporation.



## OHIO SCIENTIFIC

**THE WIZARD'S CITY** — search for gold in the dungeons beneath the Wizard's city or in the surrounding forest. A dynamic adventure allowing progress in strength and experience. All OSI — cassette \$12.95, disk \$15.95.

**OSI HARDWARE 15% OFF RETAIL PRICES!**

**GALACTIC EMPIRE** — a strategy game of interstellar conquest and negotiation. Compete to discover, conquer, and rule an empire with the computer or 1-2 other players. C4P, C8P cassette \$12.95, disk \$15.95.

**AIR TRAFFIC ADVENTURE** — a real time air traffic simulation. C4P, C8P disks \$15.95.

Plus S-FORTH, FAILSAFE +2, RPV CONTROL, ADVENTURE, TOUCH TYPING, INTELLIGENT TERMINAL and more. Send for our free catalog including photos and complete descriptions. ✓193

**Aurora Software Associates**  
37 S. Mitchell  
Arlington Heights  
Illinois 60005

## AMERICAN SOFTWARE & SYSTEMS, INC.

### SOFTWARE FOR TRS80\* MODEL I LEVEL II / MODEL III and APPLE II PLUS\*\* (Disk Format)

- 1. WORDTYPE** — word processing offering latest text editing, page length/numbering and additional features available in more expensive software. **\$89.95**
- 2. BUSINESS APPLICATIONS** — Accts Rec/Pay, Inventory, Invoice Mailing List and others. **\$69.95**
- 3. HOME APPLICATIONS & GAMES** — Checkbook, inventory, payable, recipe and others. ... **\$29.95**
- 4. SCIENTIFIC & GAMES** — Conversions, Mathematics, hydraulic calculations, bar graph presentation of data games and others. .... **\$39.95**
- 5. AMATEUR RADIO & ELECTRONICS** — Antenna design (quad/beam/dipole), db loss, ccode and others. .... **\$34.95**
- 6. GAMES** — Wheel of Fortune, Slots, Keno and more. .... **\$9.95**

#### TERMS:

Check, M.O., Visa, or Master Charge.  
Add \$1.50 for shipping and handling.

FOR CATALOG SEND \$1.50  
FOR SHIPPING AND HANDLING

### AMERICAN SOFTWARE & SYSTEMS, INC. ✓249

2110 North Carson Street  
Carson City, Nevada 89701  
(702) 883-3274

\*A trademark of Tandy Corp.

\*\*A trademark of Apple Computer Inc.

Another problem with Quicksort is that it does not perform very well with a small number of items. This can be improved by checking the size of each partition and converting to a straight insertion sort if the number of items is less than about 22. Listing 6 is the same Quicksort program in Listing 4, modified to use the straight insertion sort for small partitions. This change makes the algorithm about 8 percent faster with 500 elements to be sorted and almost 14 percent faster with 500 elements.

### Conclusion

Several other fast algorithms for sorting exist, but none of them is faster than Quicksort. Use the straight insertion sort technique when you want to sort a small amount of data or when you want a simple program, and use the Quicksort (or Quicksort/straight insertion combination) when you need a very fast sort for large amounts of data. These two techniques will give you all the sorting tools you need.

If you would like to know more about these or other sorting algorithms, see *Algorithms + Data Structures = Programs* by Nicklaus Wirth. ■

RACET SORTS — RACET UTILITIES — RACET computes — RACET SORTS — RACET UTILITIES — RACET computes — RACET SORTS — RACET UTILITIES — RACET computes —

### FIELD PROVEN!!

#### 10 MEGABYTES and MORE for the TRS-80\* Model II plus SHARED ACCESS to HARD DISK DRIVE

**Hard/Soft Disk System (HSDS)** Software allows access as single drive. You can have that 10 Megabyte continuous file - that 50,000 name mailist or inventory! Or a directory with 1000 entries! All completely compatible with TRSDOS 2.0 BASIC. You can mix floppy and hard disk drives. Includes special utilities including HPURGE, DCS Directory Catalog System, HZAP Hard Disk Superzap, and many special formatting options. Three to eight times faster than floppy! RACET quality.

**HARD DISK DRIVE & CONTROLLER** \$5995. Second User: \$595.  
**HSDS Software \$400.** (Note: HSDS now also available for CORVUS drives!!)

**INFINITE BASIC** (Mod I & III Tape or Disk) Mod I \$50.00; Mod III \$60.00  
Extends Level II BASIC with complete MATRIX functions and 50 more string functions. Includes RACET machine language sorts! Sort 1000 elements in 9 seconds!! Select only functions you want to optimize memory usage.

**INFINITE BUSINESS** (Requires Infinite BASIC) Mod I & III \$30.00  
Complete printer pagination controls — auto headers, footers, page numbers. Packed decimal arithmetic — 127 digit accuracy +, -, \*, /. Binary search of sorted and unsorted arrays. Hash codes.

**BASIC CROSS REFERENCE UTILITY** (Mod II 64K) \$50.00  
SEEK and FIND functions for Variables, Line Numbers, Strings, Keywords. 'All' options available for line numbers and variables. Load from BASIC — Call with 'CTRL R'. Output to screen or printer!

**DSM** Mod I \$75.00; Mod II \$150.00; Mod III \$90.00  
Disk Sort/Merge for RANDOM files. All machine language stand-alone package for sorting speed. Establish sort specification in simple BASIC command file. Execute from DOS. Only operator action to sort is to change diskettes when requested! Handles multiple diskette files! Super fast sort times — Improved disk I/O times make this the fastest Disk Sort/Merge available on your TRS.  
(Mod I Min 32K 2-drive system. Mod II 64K 1-drive. Mod III 32K 1-drive)

**GSF** (Mod I & III Tape or Disk - Specify Memory Size) Mod I \$25; Mod II \$50; Mod III \$30  
Generalized Subroutine Facilities. The STANDARD against which all other sorts are compared! And then compare prices! Machine language — fast and powerful! Multi-key multi-variable and multi-key character string. Zero and move arrays. Mod II includes USR PEEKS and POKES. Includes sample programs.

RACET SORTS — RACET UTILITIES — RACET computes — RACET SORTS — RACET UTILITIES — RACET computes — RACET SORTS — RACET UTILITIES — RACET computes —

#### DISCAT (32K 1-drive Min)

This comprehensive Diskette Cataloging/Indexing utility allows the user to keep track of thousands of programs in a categorized library. Machine language program works with all TRSDOS and NEWDOS versions. Files include program names and extensions, program length, diskette numbers, front and back, and diskette free space.

**KFS-80** (1-drive 32K Min — Mod II 64K) Mod I, III \$100.00; Mod II \$175.00  
The keyed file system provides keyed and sequential access to multiple files. Provides the programmer with a powerful disk handling facility for development of data base applications. Binary tree index system provides rapid access to file records.

**MAILLIST** (1-drive 32K Min - Mod II 64K) Mod I, III \$75.00; Mod II \$150.00  
This ISAM-based mailist minimizes disk access times. Four keys — no separate sorting. Supports 9-digit zip code and 3-digit state code. Up to 30 attributes. Mask and query selection. Record access times under 4 seconds!!

**COMPROC** (Mod I & Mod III — Disk only) Mod I \$20; Mod III \$30  
Command Processor. Auto your disk to perform any sequence of instructions that you can give from the keyboard. DIR, FREE, pause, wait for user input, BASIC, No. of FILES and MEM SIZE, RUN program, respond to input statements, BREAK, return to DOS, etc. Includes lowercase driver software, debounce and screenprint!

**UTILITY PACKAGE** (Mod II 64K) \$150.00  
Important enhancements to the Mod II. The file recovery capabilities alone will pay for the package in even one application! Fully documented in 124 page manual! XHIT, XGAT, XCOPY and SUPERZAP are used to reconstruct or recover data from bad diskettes! XCOPY provides multi-file copies. 'Wild-card' mask select, absolute sector mode and other features. SUPERZAP allows examine/change any sector on diskette include track-0, and absolute disk backup/copy with I/O recovery. DCS builds consolidated directories from multiple diskettes into a single display or listing sorted by disk name or file name plus more. Change Disk ID with DISKID. XCREATE preallocates files and sets 'LOF' to end to speed disk accesses. DEBUGII adds single step, trace, subroutine calling, program looping, dynamic disassembly and more!!

**DEVELOPMENT PACKAGE** (Mod II 64K) \$125.00  
Includes RACET machine language SUPERZAP, Apparat Disassembler, and Model II interface to the Microsoft 'Editor Assembler Plus' software package including uploading services and patches for Disk I/O.

CHECK, VISA, M/C, C.O.D., PURCHASE ORDER  
TELEPHONE ORDERS ACCEPTED (714) 997-4950

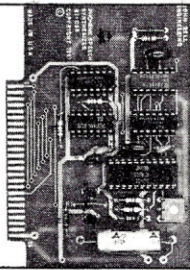
\*TRS-80 IS A REGISTERED TRADEMARK  
OF TANDY CORPORATION

**RACET COMPUTES**  
1330 N. GLASSSELL, SUITE M,  
ORANGE, CA 92667

✓101



## SPEECH SYNTHESIZERS



APPLE II®

**NEW**

Now you can have unlimited speech for your computer!

JBE's Speech Synthesizers use the Votrax® SC-01 Phoneme Synthesizer chip. The SC-01 phonetically synthesizes continuous speech of unlimited vocabulary. The SC-01 contains 64 different phonemes and 4 levels of inflection accessed by an 8 bit code. It requires 10 Bytes/sec. for continuous speech. Both Boards have an audio amp for direct connection to an 8Ω speaker.

### PARALLEL INPUT

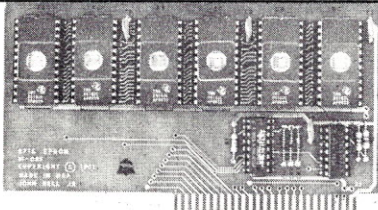
Documentation includes basic user programs, a phoneme chart and a listing of coded words to help you get started.

Documentation for the Apple II® Speech Synthesizer includes a disk with many user programs.

\*Because of the high cost of the SC-01 at this time, it will be sold separately. In this way, as the price goes down, we can pass the savings on directly to you.

81-088 Apple II® Speech Synthesizer	\$79.95
81-120 Parallel Input Speech Synth. (On board power supply, Wall transformer included)	\$89.95
SC-01 Phoneme Synthesizer Chip	\$59.95

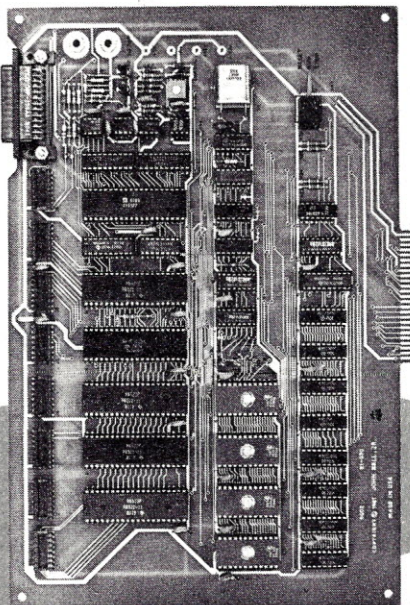
## EPROM EXPANSION CARD



JBE EPROM Expander for the Apple II holds six 5 volt 2716s for a total of 12K bytes of ROM. This board takes the place of the on board ROM in the Apple. It is software switchable by the same technique used by the Apple® II firmware card. Solder jumpers are for reset to the Apple ROM or 2716s on the card. (EPROMs available separately). Use JBE EPROM programmer and parallel I/O cards to program your EPROMS.

81-085K Kit	\$49.95
81-085A Assm.	\$59.95
81-085B Bare Board	\$39.95

## JBE I MICROCOMPUTER



JBE's 7 3/4" x 11 3/4" 6502 base Microcomputer has the capacity for 16K of EPROM, 4K of RAM, 8 Parallel Ports and 1 Serial Port. Monitor and Tiny Basic are also available. The fully populated version includes:

- 1 6502 CPU
- 4 6522 VIA (8 Parallel I/O Ports)
- 1 AY5-1013 (Serial I/O Ports)
- 8 2114 RAM (4K)
- 2 2716 EPROM (monitor & tiny basic)

The partially populated version includes:

- 1 6502 CPU
- 1 6522 VIA (2 Parallel I/O Ports)
- 1 AY5-1013 (Serial I/O Port)
- 2 2114 RAM (1K)
- 1 2716 EPROM (with monitor)

Both versions include sockets for 4 2716s or 2732s, 8 16 pin sockets for I/O interfacing and a DB25 connector for RS232.

All address and data lines, power supply, RDY, interrupts, DMA, phase 1 & phase 2 clock, RW, reset and NMI & IRQ are brought off the board to the 50 pin edge connector. (similar to the Apple II® bus)

This board also features power on reset and cassette interface.

Documentation includes 6502 programming manual & Complete doc. for the 6522 VIA. Also included is doc. for interfacing with JBE A-D & D-A Converter, Solid State Switches, EPROM Programmer & Parallel Input Speech Synthesizer.

81-030C Fully Populated JBE I	\$349.95
81-030M Partially Populated JBE I	\$249.95
81-030B Bare Board JBE I (Doc. Incl.)	\$ 89.95
2716 EPROM (with monitor)	\$ 19.95
2716 EPROM (with tiny basic)	\$ 19.95

## A TO D CONVERTER

**NEW**

JBE's 16 channel A-D Converter plugs into your Apple II® Computer. It uses an ADC0817 which incorporates a 16 channel multiplexer and an 8 bit A-D Converter. The 16 inputs are high impedance and the voltage range is 0 to 5 volts. Conversion time is <100 μsec. The resolution is 8 bits or 256 steps, linearity is ± 1/2 step. Two 16 pin DIP sockets are used for input, GND & reference voltage connections. There are 3 single bit TTL inputs. Doc. includes sample program.

81-132B Bare Board	\$29.95
81-132K Kit	\$69.96
81-132A Assm. & Tested	\$89.95

## REAL TIME CLOCK

**NEW**

JBE's Real Time Clock Card for the Apple II® computer has automatic leap year calculation, month & date and can time down to .1 sec. It uses an MM58174 Real Time Clock chip, has interrupt capability and has separate time intervals of 60 sec, 5 sec & .5 sec. An on board 2716 holds 8 user programs which are switch selectable. A 32768 Hz crystal is used for accuracy. On board battery will keep correct time for up to one year.

81-135B Bare Board	\$ 39.95
81-135K Kit	\$ 99.95
81-135A Assm. & Tested	\$119.95

## CRT CONTROLLER

This intelligent CRT Controller uses an 8085A CPU & an 8275 Integrated CRT Controller. It features: • 25 lines (80 Char./line) • 5x7 dot matrix • Upper & lower case • two 2716s (controller & char. generator) • serial interface RS232 & TTL • baud rates of 110, 150, 300, 600, 1200, 2400, 4800 & 9600 • keyboard scanning system • unencoded keyboard is req'd • uses +5V & ± 12V power supplies • Doc. includes program listing & composite video circuit.

Bare Board only (Doc. Incl.)	\$39.95
Programmed 2716s	\$19.95

## ICS

6502	\$9.95
6522	\$9.95
Z80 CPU	\$9.95
Z80 PIO	\$9.95
2716	\$14.95
2716 Programmed	\$19.95



**JOHN BELL ENGINEERING, INC.**

ALL PRODUCTS ARE AVAILABLE FROM JOHN BELL ENGINEERING • P.O. BOX 338  
REDWOOD CITY, CA 94064 • ADD SALES TAX IN CALIFORNIA • ADD 5% SHIPPING & HANDLING

MC

(415) 367-1137

10% OUTSIDE U.S.A.

VISA



# 1802 Editor/Assembler

By Barry Erick

The Quest Electronics Editor/Assembler is for any 1802, so they issue the I/O and break routines to the user. But while they supply sample I/O routines, these have to be modified for use with the Elf-II and VID board. The following changes will get the Editor/Assembler up and running.

## Serial I/O

First enter the serial I/O as listed in Quest's Editor/Assembler manual,

026E	09	52
08B0	09	73
0950	80	55
0952	8F	73 9F D4 0A 09
0958	12	F0 AF 9F D5
0973	8F	73 9F D4 0A
0978	06	12 F0 AF 9F D5
0A01	0A	
0A04	0A	
0A15	09	
0A18	50	
0A28	3F	
0A36	37	
0A58	30	
0A94	0A	
0AA3	3F	
0AA8	37	
0AAD	3F	
0AB2	37	
0AB7	3F	
0AC2	09	
0AC5	50	

Table 1. Changes and additions to the Editor/Assembler and Serial I/O necessary to run it on an Elf II.

page 8-8, in memory locations 0A00 to 0AF7 (hexadecimal). Then change all data in the serial I/O as listed in Table 1. Also enter the Register Save and Reset routine as listed in the same table. This is necessary to save R F.0, which is used in the Serial I/O routines, but not saved and reset in the built-in register routines in the Serial I/O routine.

This gives you the necessary serial I/O needed to operate the Editor/Assembler. The data rate must be added though, along with the Break routine. I also added a routine to check for form feed (CLS) and provide the delay necessary when the VID board is used. This is necessary because the VID board can take 1.5 seconds to erase the entire screen; and if the delay isn't provided, some characters would be lost, since the computer is outputting characters while the VID

board is still erasing.

## The Data Rate

First, so that the data rate is correct from a warm start, I keep the data rate constants in memory at program location 0950 and 0951 (hexadecimal). This is reflected in the serial I/O by the changes at 0A15, 0A18, 0AC2 and 0AC5. To find the constant for any other rate, enter and run the program in Table 2. When entered, hit the return key. This will compute and automatically place the correct data rate constants in the program memory, and the program will halt. Be sure to

0000	F8 06 A3 F8 00 B3 D3 C0
0008	0A 00
0ACC	00
Original:	
0000	F8 0D C8 F8 00 A6 F8 0D
0008	A3 F8
0ACC	D5

Table 2. Data Rate Find program and the original bytes which must be reinserted after finding the data rate.

093D	09 90
0946	60
0960	F8 0C 32 66 30 3F F8 40
0968	BF 2F 9F 3A 69 F8 0C BF
0970	30 3F
0990	D4 09 3F 45 4C 46 20 49
0998	49 20 6D 6F 64 73 20 62
09A0	79 20 42 41 52 52 59 20
09A8	45 52 49 43 4B 0D 00 C0
09B0	00 B0

Table 3. The CLS delay routine, plus a headline.

Address correspondence to Barry Erick, 28 Ridge St., Dallas, PA 18612.



change 0ACC to 00 before you run the Data Rate Find program to kill the program, and to change 0ACC back to its original value (D5) after. Also be sure to reenter the first ten locations of the Editor/Assembler program to their original value. (The "find the data rate" portion of the serial I/O is used only this one time.)

### CLS Delay

To provide a delay on the CLS (form feed) routine, I changed the character output routine to check for a 0C (ASCII form feed) after it has been output to the Serial Out routine and returned to the main program. If found, a delay routine is entered to waste some time while the VID board catches up. The output character is passed to, and returned from, the Serial Out routine in both the D register and RF. 1. The changes needed to add this feature are listed in Table 3.

### The Break Routine

Quest also provided space in the Editor/Assembler for a Break routine, which you must write. (They do provide a sample listing, but it won't help the Elf II user.) Using only the hex input key usually provides a break that aborts any listing. Sometimes, though, especially if you don't have hard copy, you would like to just momentarily stop the listing in progress, and then resume. The routine I wrote gives you just such an option. Pressing the input key during a listing gives us a break, and the Break routine then waits for an input from the ASCII keyboard. If a space is encountered, the listing continues. But if a Return is entered, the listing aborts. (Any other entry is nearly ignored.) The Break routine, and changes needed in the Editor/Assembler, are listed in Table 4.

### Monitor Jump

As stated, a monitor jump has to be

089D	0A 03
08A0	09 7E
087E	D4 09
0980	52 FB 20 C2 08 A2 FB 2D
0988	C2 00 03 30 7E
0AF3	3F FA F8 00 FF
0AF8	00 D5 F8 00 FC 00 D5 00

Table 4. The Break routine.

provided. Table 5 shows the changes to be made to the program, to be able to jump into the Netronics Monitor at F000.

### Moving into EPROM

I have my copy of Quest's Editor/Assembler resident in EPROM. Since the Editor/Assembler is not written in relocatable code, all address reference data had to be searched for and changed to the new page. It turns out that after starting and searching, I found 180 changes to make to move the Editor/Assembler into EPROM. Those changes are shown in Table 6.

### Memory Allocation

In either the RAM version or in the EPROM version of the Editor/Assembler, attention must be given to memory allocation. Table 7 gives my recommended locations. Refer to Quest's manual, page 5-2, for the addresses of the program that you need to change.

Note that for the EPROM version, the addresses to be changed are found by adding the EPROM starting address to the printed address. Also, in the EPROM version, the label table I recommend is two pages long while Quest recommends one page. I did this when I quickly ran out of label space. Two pages let you produce about 64 labels.

### Conclusion

After you make the changes necessary to get Quest's Editor/Assembler up and running on your Elf II (whether or not you put it in EPROM), assemble some programs using the Editor/Assembler. I think that you'll agree that it's much easier to do this than to use machine code to write a program (unless the program is very short). ■

*The Editor/Assembler is available for \$25 from Quest Electronics, PO Box 4438, Santa Clara, CA 95854.*

0478	08 A5
08A5	F8 00 A0 F8 F0 B0 E0 D0 00

Table 5. The Monitor jump listing.

Table 6. The changes necessary to place the Editor/Assembler in EPROM. "X" is the first page of the EPROM address. Ex: Editor is to be in EPROM at C000 to CAFF. In this example X=C0; X+8=C8; etc.

000A=X	000E=X+8	001E=X+3	0028=X+2
002D=X+2	0030=X+2	0046=X+4	0054=X+3
0062=X+2	0067=X+7	006A=X+4	006D=X+2
0070=X+1	0075=X+8	0078=X+1	007D=X+1
0080=X+2	0084=X+1	008A=X+2	0094=X+4
0099=X+2	009C=X+2	00A6=X+1	00A9=X+1
00AE=X+8	00B9=X+2	00BC=X+2	00C1=X+2
00C4=X+2	00CC=X+2	00D9=X+4	00DE=X+2
00E9=X+1	00EF=X+1	00FB=X+2	0101=X+1
0104=X	0138=X+2	013E=X+2	015C=X+8
0165=X+2	016D=X+2	0187=X+2	0190=X+1
0197=X+2	019A=X+1	01A0=X+2	01CD=X+1
01D0=X+2	01F8=X+2	01FF=X+1	0202=X+1
020D=X+4	0210=X+2	023B=X+2	024E=X+2

More →



# Buy by Mail and SAVE!

## COMPUTERS



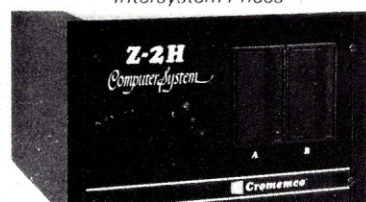
### Intertec Superbrain SPECIALS

64K Ram, List \$3495 ..... \$2595  
64K Quad, List \$3995 ..... \$2995

### NorthStar

Horizon I 32K DD List \$2695 .... \$1989\*  
Horizon I QD List \$2995 ..... \$2245\*  
Horizon 2 32DD List \$3095 ..... \$2289\*  
Intersystem DPS-1 List \$1749 .... \$1495\*

Call for latest NorthStar and  
Intersystem Prices



Cromemco Z-2H, List \$9995 .... \$7945  
System 2, 64K List \$4695 ..... \$3749  
System 3, 64K, List \$7995 ..... \$6395

### Disk Systems

Thinker Toys Discus 2D ..... \$939  
Dual Discus 2D ..... \$1559  
Discus 2 + 2, List \$1549 ..... \$1259  
M26 Hard Disk, List \$4995 ..... \$3949

### Printers & Terminals

Paper Tiger IDS-445 ..... \$649  
with graphic option ..... \$719  
Centronics 730-1, List \$795 ..... \$549  
737-1, List \$995 ..... \$769  
704-9 180 cps ..... \$1495  
703-9 180 cps ..... \$1569  
TI 810, List \$1895 ..... \$1489  
NEC SPINWRITER 5530 ..... \$2395  
NEC SPINWRITER 5515 ..... \$2395  
Diablo 630 List \$2711 ..... \$2399  
Intertube III List \$895 ..... \$729  
Zenith Z-19 ..... \$719  
Televideo 912C ..... \$679  
920C ..... \$799  
950 ..... \$999  
Hazeltime 1420 ..... \$789  
1500 ..... \$845  
Soroc 120 List \$995 ..... \$689  
IQ135 ..... \$719  
140 ..... \$994

## Computers Wholesale

P.O. Box 144 Camillus, NY 13031 ✓ 227



(315) 472-2582



Most items in stock for immediate delivery. Factory sealed cartons,  
w/full factory warranty. NYS residents add appropriate sales tax.  
Prices do not include shipping. VISA and Master Charge add 3%.  
C.O.D. orders require 25% deposit. Prices subject to change without  
notice.

Table 6 continued.

0257=X+7	025E=X+4	0263=X+2	026B=X+8
026E=X+9	0279=X+2	028E=X+2	02A7=X+8
02DC=X+3	02DF=X+4	02E2=X+3	02E5=X
02F6=X+3	0302=X+2	031A=X+2	031A=X+2
031D=X+1	032A=X+1	0339=X+3	0347=X+7
034C=X+3	0373=X+3	039A=X+1	039F=X+6
03A4=X+5	03A7=X+2	03AB=X+8	03AF=X+5
03B5=X+2	03D3=X+5	03EF=X+3	03F2=X+3
03F5=X+4	03FE=X+4	041A=X+5	041E=X+3
0421=X+3	0424=X+3	0427=X+3	0440=X+5
0462=X+2	0466=X+3	046C=X+3	0474=X
0478=X+8	047B=X	047E=X+1	048B=X+2
048E=X+2	0497=X+3	049C=X+3	049F=X+3
04BE=X+2	04CC=X+2	04D4=X+3	04DD=X+3
04E7=X+3	04F9=X+8	0505=X+3	0511=X+1
0515=X+3	0518=X+4	052D=X+3	0549=X+3
055A=X+4	0560=X+5	0564=X+3	0579=X+4
057E=X+1	0582=X+3	0585=X+4	0588=X+4
05A4=X+7	05A7=X+4	05B3=X+5	05B9=X+1
05BE=X+4	05C3=X+5	05DA=X+2	05DD=X+1
05E8=X+5	05EB=X+3	05F8=X+5	05FC=X+5
07E1=X+2	07F2=X+5	07FE=X+2	0835=X+2
0841=X	0848=X+2	0873=X+3	087A=X+2
087D=X+2	0880=X+2	0883=X+2	0886=X
0889=X+2	088C=X+2	088F=X+2	0892=X+2
0895=X+2	089A=X+5	089D=X+A	08A0=X+9
08A3=X+3	08B0=X+9	08BF=X+4	08C2=X+2
08CD=X+2	08E6=X+3	08E9=X+4	08EF=X+9
097F=X+9	0984=X+8	0989=X	098C=X+9
0991=X+9	09B0=X	0A15=X+9	0AC2=X+9

(a)

xy3D=Stack  
xy00=Text Buffer  
0C00=Source/Object Code  
0B00=Label Table  
0000=Editor/Assembler

(b)

xy3D=Stack  
xy00=Text Buffer  
0200=Source/Object Code  
0B00=Label Table

Table 7. The typical memory allocations, where "xy" is the last RAM page in memory. Table 7a shows the RAM version, while 7b shows the EPROM version.



# SPEED POWER EFFICIENCY

## OSI 65D3 SYSTEMS

### R-EDIT: Edit any program or text with ease! \$40

- FULL CURSOR control. Insert, delete, add anywhere on the screen.
- BASIC, assembler, etc. edited without reloading RAM-resident editor.
- SYSGEN relocates R-EDIT and customizes.

### SPUL65: Printer Spooler & Virtual Indirect File \$95/\$10

- DON'T WAIT for your printer. Process words. Write programs. Put multiple print jobs in the queue. Keep working while the printer runs!
- TWO printers accommodated on any ports. Multiple copies with pagination.
- SYSGEN relocates SPUL65 and allows extensive customization.
- VIRTUAL INDIRECT FILES on disk. End space problems when using temporary files. Now do extensive editing of BASIC with your word processor.

### XREF: BASIC Cross Referencer \$25

- TABULATES: Referenced line numbers, all variable names, and functions.
- FAST machine language program.
- DISK based to handle the largest BASIC source files on any drive.

### FBASIC: BASIC Compiler \$155/\$10

- FAST machine code now can be written with the ease of BASIC.
- SPEED-optimized, native-code compiler. An integer subset of OSI's BASIC.
- DISK based to allow large source and object files.
- EXTENSIONS to BASIC for: Easy interface to system hardware/software. Direct access to 6502 registers. Array initialization and optional absolute location. WHILE and other structures. Interfacing compiler output and interpreter.
- UTILITIES (plus source), manual, and many useful examples.

### CP/M to OSI Translation

Frustrated by all those good CP/M disks that won't run on your OSI CP/M system? Send us your disk, \$15, and we'll send it back with an OSI compatible version.

Manual orders applied to software purchases. Programs supplied on 8-in. single-density, single-sided disks. Hawaii residents add 4% tax.



✓13

Data Resource Corporation, Suite 201  
1040 Lunaei St., Kailua, HI 96734 (808) 261-2012

# EDUCATIONAL CROSSWORD PUZZLES FOR APPLE II

## CROSSWORD MAGIC™

- You supply words... Crossword Magic™ automatically interconnects and builds a puzzle.
- Play the puzzles with Crossword Machine™ features.
- Print hard copy playable version.
- Great teaching aid for classroom fun and learning.
- A vocabulary builder for all grade levels.
- Separate maker and player diskettes for versatility.

TWO DISKETTE PACKAGE ... \$79.95

ADDITIONAL PLAYER DISKS ... \$24.95

DETAILED INFORMATION BOOKLET ... \$2.00

System requirements: Apple II or Apple II+ with 48K 3.3 DOS  
Printer requirements: Apple Silentype or Epson MX-80, MX-100.  
Epson printer requires "Grafrax" rom upgrade kit with parallel interface.

## THE CROSSWORD MACHINE™

### PLAY THE PUZZLES... EASY HARD AND TOPICAL.

- No need for box numbers.
- Appropriate clue always in view.
- Save progress feature.
- "Answer sheet" overlays puzzle.
- Fun and educational for all ages.

- High resolution graphics.
- Direct typing on puzzle.

### CREATE YOUR OWN PUZZLE.

- Puzzle size up to 20 x 20 boxes.
- Interconnect your own words.
- Save your puzzle.

DISK ... \$29.95 EA.

System requirements: Apple II+ with 48K 3.3 DOS

See Your Local Dealer For More Information Or A Demonstration  
Dealer And School District Inquiries:

L & S Computerware, 1589 Fraser Dr. Sunnyvale, CA 94087  
Or Phone (408) 738-3416.

\*Apple II and Silentype are trademarks of Apple Computer Inc.

\*MX-80, MX-100 and Grafrax are trademarks of Epson America Inc.

TO ORDER CALL TOLL FREE 24 HRS.

(800) 227-1617 EXT. 481 IN CA (800) 772-3545 EXT. 481

Please add \$2.00 for postage and handling.



## L & S COMPUTERWARE

P.O. BOX 70728 SUNNYVALE, CALIFORNIA 94086



## MICROSTAT™ Release 2.0

NEW  
RELEASE!

Just some of the new features of Microstat Rel. 2.0 include: new programs for moments about the mean, skewness, kurtosis and stepwise multiple regression, longer file names, faster sort routine, the ability to declare each data file's numeric precision and drive location plus an expanded user's manual with new appendices for the equations and file structures used in Microstat. Also included is a Data Management Subsystem for file maintenance (edit, list, destroy, augment, sort, rank-order, move and merge) plus transformations (add, subtract, multiply, divide, reciprocal, log, natural log and antilog, exponentiation and linear) that allow you to create new variables from existing variables.

After file creation with DMS, programs for analysis include: Descriptive statistics, Hypothesis testing (mean and proportion), ANOVA (one-way, two-way, and random blocks), Scatterplots, Frequency distributions, Correlation analysis, Simple, Multiple and Stepwise Multiple Regression (including files larger than available memory), Time series, 11 Nonparametric tests, 8 Probability distributions, Crosstabs and Chi-square, Combinations, Permutations and Factorials (up to one million factorial). All program output is neatly formatted for easy use.

The price for Microstat Rel. 2.0 is \$295.00 and the user's manual is available for \$25.00 (credited towards purchase) and includes sample printouts with file labels that reference standard statistical texts and journals so you can compare the results from Microstat to those produced on much larger systems. Compare Microstat to any other package on the market and we think you'll agree that Microstat is the best at any price.

ECOSOFT, INC. ✓82

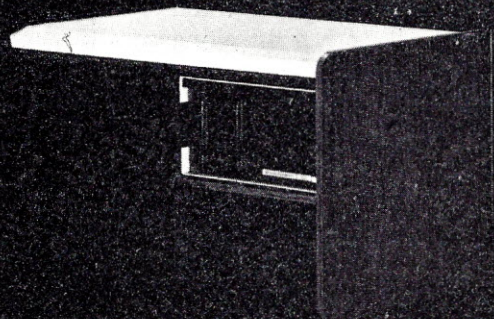
P.O. BOX 68602  
INDIANAPOLIS, IN 46268-0602  
(317) 283-8883



# Desk Main/Frame Desk Main/Frame

## LOW COST & ATTRACTIVE STYLING

- MAIN/FRAME INTEGRATED INTO FURNITURE QUALITY DESK
- ELECTRONICS PACKAGE SLIDE MOUNTED FOR EASY ACCESS
- SUPPORTS TWO 8" FLOPPY DRIVES FROM SEVERAL MANUFACTURERS (DRIVES NOT INCLUDED)
- 10 SLOT MOTHERBOARD INCLUDES CONNECTORS
- POWER SUPPLY FOR DRIVES AND CARDS
- DESK AND MAIN/FRAME AVAILABLE SEPARATELY
- MATCHING PRINTER DESK AVAILABLE



WRITE OR CALL FOR OUR BROCHURE WHICH INCLUDES  
OUR APPLICATION NOTE: 'BUILDING CHEAP COMPUTERS'

## INTEGRAND ✓77

8474 Ave. 296 • Visalia, CA 93277 • (209) 733-9288  
We accept BankAmericard/Visa and MasterCard



# Parti-Colored Picture Pad

By M. L. Shore and L. K. R. Williams

**W**e had finished building the Motorola TVBUG, and the world of electric color was at our fingertips. Exploiting the system's color graphics abilities was just a question of providing a substantial amount of software support.

The program described here uses the computer as a color slate for drawing pictures. Drawing is done by picking a color via the keyboard, and holding down one of the four cursor-control keys. A pseudo-color (cursor skip) lets you move the cursor around without disturbing the picture. A cursor home key lets you place the cursor at the top left-hand pixel (picture element) of the screen.

A number of special function keys (see Table 1) let you break out of the graphics mode, save pictures and restore them. It is heartbreaking to spend hours composing a modern-day Mona Lisa, only to switch the machine off. The storage-and-retriev-

al feature is useful for demonstrating the graphics capabilities of the TVBUG system.

## TVBUG

The TVBUG system allows for 12 different video-display graphics (VDG) modes—two alphanumeric, two semigraphics and eight graphics (see Table 2). The normal working mode of the system is, predictably, alphanumeric internal. The graphics mode we have chosen for this application is graphics 2C. In this mode the screen is divided into a 128 by 64 pixel array, held in memory as 2K bytes. Each byte represents four pixels in a horizontal row. The graphics 2C mode can be used with one of two color sets (but not both): green, red yellow and blue or buff, orange, cyan and magenta. You choose the color set when the system is put into graphics mode via a memory-mapped pin on the VDG chip.

## Cursor Keypad

Although it's not included as part of the TVBUG kit, you can attach a cursor-control keypad to the system. The five cursor-control pins on the keyboard connector are attached to 10k resistors, which go to ground. They also connect to one side of a normally open switch (the cursor-control key). The other side of this switch is con-

Command	Function
Esc	revert to monitor
Q	revert to start of program
S	store current picture
L	put stored picture back onto screen
C	select cursor-skip
G	select green/buff
R	select red/orange
Y	select yellow/cyan
B	select blue/magenta

Table 1. Keyboard commands.

Mode	Description	Color set
alphanumeric internal	32 × 16	—
alphanumeric external	32 × 16	—
semigraphics 4	64 × 32	all eight
semigraphics 6	64 × 48	green yellow blue red
graphics 1C	64 × 64	green yellow blue red
graphics 1R	128 × 64	green black
graphics 2C	128 × 64	green yellow blue red
graphics 2R	128 × 96	green black
graphics 3C	128 × 96	green yellow blue red
graphics 3R	128 × 192	green black
graphics 6C	128 × 192	green yellow blue red
graphics 6R	256 × 192	green black

Table 2. VDG modes.

Address correspondence to M. L. Shore and L. K. R. Williams, Defence EDP, PO Box 50247, Porirua, New Zealand.



nected to a +5 V supply (see Fig. 1).

## The Program

The layout of the program is described in Fig. 2. As you can see, subroutines are not called directly but via a subroutine-jump table. This lets you relocate subroutines safely, and was invaluable in program testing.

The initialization phase of the program is 0100 through 0150 (hexadecimal). This phase puts a heading on the screen, and asks for the color set. The reply is decoded and stored as the VDG mode byte. Then the background color is requested, the answer decoded and a four-pixel color byte stored. The program is then put into graphics mode by altering locations F441 through F443, the screen is filled with the background color and the cursor is homed.

0151 through 018F represents the main program-control loop, shown in flowchart form in Fig. 3. The keyboard input byte is mapped to F404, and the cursor keypad input to F406. Little needs to be explained about this control loop—it is quite straightforward. Note the use of a complemented pixel as the cursor.

The decode-color subroutine, 0193

through 01B3, uses the hexadecimal representation of the four color codes—GRYB (green, red, yellow, blue)—to generate the correct VDG two-bit code for the pixel. Note that the subroutine generates a byte full of these pixels.

The move-cursor routine, 01B8 through 01E4, is outlined in the flowchart in Fig. 4. When designing the system, we decided to hold the cursor position as an (x,y) coordinate pair, rather than as an address and pixel position. This makes cursor movement easy but requires address and mask generation for each screen access. In practice the (x,y) coordinate-pair method was simple and effective. Note the use of (x,y) coordinate masks in the subroutine which provide horizontal and vertical wraparound.

01EB through 0222 contains the get-screen-address-and-mask subroutine. This is represented as a flowchart in Fig. 5, and is relatively simple.

0229 through 0240 is the string-out subroutine used to place the program heading and question strings on the screen at a specified position (bytes 0010,0011). The subroutine merely copies bytes from one memory location to another.

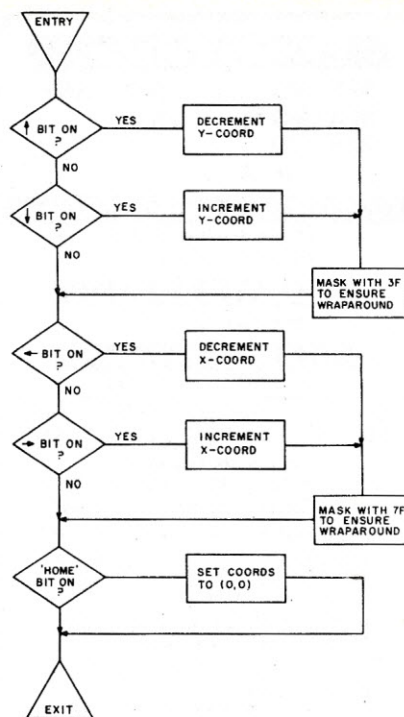


Fig. 4. Move cursor.

The store-pixel routine, 0247 through 026A, puts a pixel onto the screen. As can be seen from Fig. 6, this involves getting the screen byte,

(text continued on page 174.)

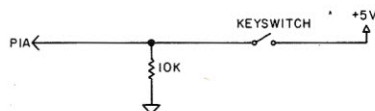


Fig. 1. Cursor-control key circuitry.

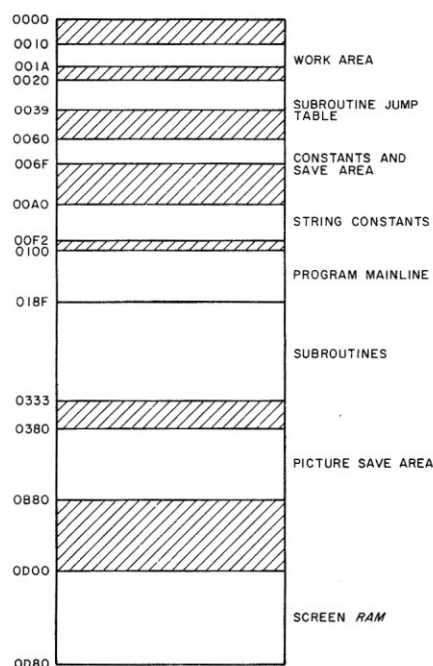


Fig. 2. Program layout.

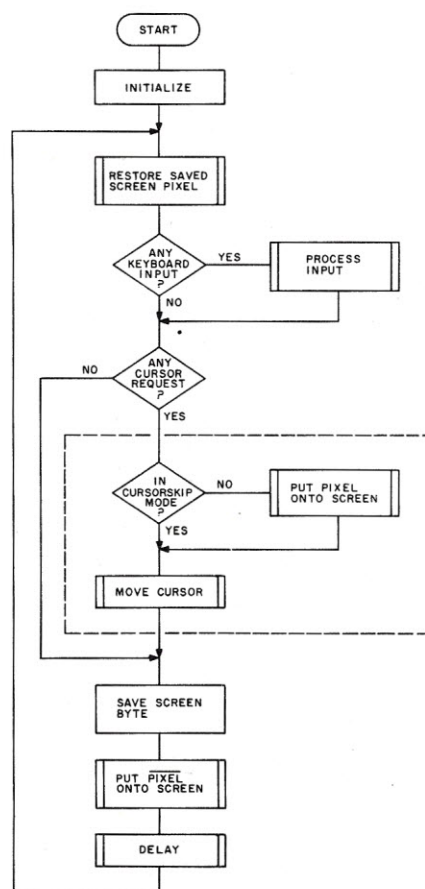


Fig. 3. Overall flowchart.

## \*\*SPECIAL\*\* SPECIAL\*\* TRS-80 ADD ON DRIVES IMMEDIATE DELIVERY

SINGLE SIDED \$225.00  
DOUBLE SIDED \$345.00

COMPLETE SYSTEMS  
SINGLE SIDED \$365.00  
DOUBLE SIDED \$485.00

### INCLUDES:

MINI DISK DRIVE  
FUSED POWER SUPPLY  
VENTED CABINET  
CABLE  
90 DAY WARRANTY  
FACTORY ASSEMBLED  
FACTORY TESTED

THESE ARE NEW 5" FD's

**2** INTERFACE, INC. 151  
20932 CANTARA ST  
CANOGA PARK, CA 91304  
(213) 341-7914  
VISA AND MASTER CHARGE ACCEPTED



## EPSON Printers

**MX-80**

**MX-80ft**  
**MX-70**

**MX-100**

CALL FOR PRICES

We have accessories

## C. ITOH Starwriter Printers

25 cps Parallel \$1425

45 cps Parallel \$1770

## OKIDATA Printers

Microline 80 \$410

## DIABLO Printers

630 RO \$1990

UDS	MODEM	103LP	\$169
LEXICON	MODEM	LEX-11	\$125

Scotch 3M Diskettes

8"	SSSD	10/\$2.79	50/\$2.69
5 1/4"	SSSD	10/\$2.69	50/\$2.59

APPLE SOFTWARE PGM'S 15% OFF

VISICALC \$159

SOFTCARD \$296

BASIC-80 CP/M \$297

BASIC COMPILER CP/M \$335

Write or call for additional programs.

ask for free listing

# J.C. Datatron

P.O. Box 305

Massapequa, N.Y. 11758

(516) 798-7448

FOB Shipping Point NYS Res. Add Sales Tax

Terms: M.O., Cert. Checks. Allow 2 weeks for Personal Chks.

PRICES SUBJECT TO CHANGE

## COMMODORE:

VIC-20 color computer	\$ 289
4016 PET, 16K	799
8032 CBM, 32K	1,249
8096 CBM, 96K	1,699
4031 single drive, 170K	559
4040 dual drive, 343K	1,059
8050 dual drive, 974K	1,469
4022 tractor printer	649

\*available fall

## ATARI:

400 computer, 16K	\$ 369
800 computer, 16K	749
810 single drive, 88K	469
815 dual drive, 320K	1,129
820 40 column printer	279
825 80 column printer	749
830 modem	149
850 interface module	159

## PRINTERS & ACCESSORIES:

ANADIX DP9000/1	\$ 1,199
DP9500/1	1,299
BASE2 800B	649
CENTRONICS 737-1	749
C. ITOH STARWRITER, 25p	1,439
STARWRITER, 45p	1,849
NEC SPINWRITER, 5530p	2,399
OKIDATA MICROLINE 82	599
MICROLINE 83	899
MILOT, graphics plotter	1,139
AXLON 32K, ATARI ramcrum	189
MICROTEK 16K, for ATARI	89

## EXIDY CLOSE-OUT:

SORCERER, 16K (limited quantities) 599



**MicroComputer**  
**Warehouse**

3620 La Habra Way  
Sacramento, Ca. 95825  
(916) 486-3678

Call or write for price list with comparable savings on a full line of microcomputer peripherals and accessories. Master Charge/Visa welcome. We pay freight (continental U.S. only) on prepaid orders. Allow 2 weeks for personal checks.

Prices subject to change without notice.

Program listing in 6800 machine code.

0020	0271	(clear screen
0022	0229	(string out
0024	FEE1	(char in - echo back
0026	0285	(delay
0028	FFA8	(monitor initialize
002A	0193	(decode color
002C	01EB	(get address & mask
002E	02B4	(process input
0030	0298	(get byte from screen
0032	0247	(store pixel on screen
0034	01B8	(move cursor
0036	02F8	(store picture
0038	0317	(load picture
0060	00	(b/g color
0061	00	(x-coord
0062	00	(y-coord
0063	00	( -
0064	3FCFF3FC	(pixel masks
0068	11	(VDG mode
0069	0000	( -
006B	00	(current color request
006C	00	(cursor-skip indicator
006D	0380	(start of picture save area
00A0	4348524F4D41205049435455524500	(CHROMA PICTURE
00B8	475245454E204F5220425546462053455400	(GREEN OR BUFF SET
00D0	4241434B47524F554E4420434F4C4F5200	(BACKGROUND COLOR
0100	DE28 LDX \$28	(system initialize
	AD00 JSR X	
	CED069 LDX =\$D069	(put heading onto screen
	DF10 STX \$10	
	86A0 LDA A =\$A0	
	DE22 LDX \$22	
	AD00 JSR X	
010F	CED0A0 LDX =\$DOA0	(ask for color set
	DF10 STX \$10	
	86B8 LDA A =\$B8	
	DE22 LDX \$22	
	AD00 JSR X	
	DE24 LDX \$24	(get and decode answer
	AD00 JSR X	
	8401 AND A =\$01	
0120	8A10 OR A =\$10	
	9768 STA A \$68	
	CED0E0 LDX =\$DOE0	(ask for background color
	DF10 STX \$10	
	86D0 LDA A =\$D0	
	DE22 LDX \$22	
	AD00 JSR X	
012F	DE24 LDX \$24	(get and decode answer
	AD00 JSR X	
	DE2A LDX \$2A	
	AD00 JSR X	
	9760 STA A \$60	
	4F CLR A	(put program into graphics mode
	B7F441 STA A \$F441	
	43 COM A	
013E	B7F442 STA A \$F442	
	9668 LDA A \$68	
	B7F443 STA A \$F443	
	DE20 LDX \$20	(clear graphics screen
	AD00 JSR X	
	9763 STA A \$63	(save screen byte
	4F CLR A	(home cursor
	9761 STA A \$61	
014F	9762 STA A \$62	

More



# ECLECTIC SYSTEMS CORPORATION

**Authorized Commodore service center**  
**Repair of the complete line of Commodore products**  
**In a hurry? Check our modular exchange program**



## HARDWARE:

CBM 8032 Computer, 80 Column	\$1195
CBM 8050 Disk Drive	1395
CBM 4032 Computer, 40 Column	995
CBM 4040 Disk Drive	995
CBM 4022 Printer	649
CBM VIC 20 Computer	263
CBM VS100 Cassette	68
PET to IEEE Cable	33
IEEE to IEEE Cable	39
BASF Diskette, Box of 10	30

## SOFTWARE:

OZZ	\$299
Wordcraft 80	299
Tax Preparation System	380
IRMA	380
Dow Jones Portfolio Management System	115
Personal Tax	55
Pascal	229
Assembler Development Package	77
Wordpro 4+	329

**Order TOLL FREE 1+800-527-3135**

**10 AM to 4 PM CDT Monday through Friday**

Texas residents call 1+214-661-1370

VISA, MASTER CHARGE, MONEY ORDERS, AND C.O.D. "Certified Check" accepted.

Units in stock shipped within 24 hours, F.O.B. Dallas, Texas.

All equipment shipped with manufacturer's warranty.

Residents of Texas, Louisiana, Oklahoma City and Tulsa, Oklahoma must add applicable taxes.

Eclectic shortly will be announcing products that are designed to work with CBM systems.

1. ROMIO: two RS232 ports—three parallel ports—26K EPROM memory-managed alternate character set, software controlled—EDOS (extended DOS).

2. Terminal program (options with ROMIO)

4. Front-end processor

3. EPROM programmer

5. Additional firmware to be announced

Be sure to write the address below for more information; dealer inquiries welcome.

**P.O. Box 1166 • 16260 Midway Road • Addison, Texas 75001 • (214) 661-1370**



# MICROSYSTEMS

39 E. Hanover Ave., Morris Plains, NJ 07950

Finally, there's a magazine with up-to-date, informative articles for the serious microcomputer user! MICROSYSTEMS focuses on CP/M, Pascal, and related software, on North Star and S-100 bus hardware (including 16-bit systems). You'll find applications, tutorials, hardware and software reviews, and a software directory. **Keep up on the latest developments in the S-100 and CP/M world with MICROSYSTEMS!**

- ☐ Sign me up!  
☐ Send a sample copy! (\$2 enclosed)  
☐ Send more information.

KBLH

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State/Zip \_\_\_\_\_

Term	USA	Canada, Mexico (Air)	Foreign
1 YR ( 6 issues)	<input type="checkbox"/> \$10	<input type="checkbox"/> \$15	<input type="checkbox"/> \$25
2 YR (12 issues)	<input type="checkbox"/> \$18	<input type="checkbox"/> \$27	<input type="checkbox"/> \$48
3 YR (18 issues)	<input type="checkbox"/> \$24	<input type="checkbox"/> \$38	<input type="checkbox"/> \$69

- ☐ Payment enclosed    ☐ Bill me (\$1 Charge)  
☐ VISA   ☐ MasterCard   ☐ American Express

Card Number: \_\_\_\_\_ Exp. Date: \_\_\_\_\_

Signature: \_\_\_\_\_

## TRS-80\*

### SAVE A BUNDLE

**When you buy your TRS-80™ equipment!**  
 Use our toll free number to check our price before you buy a TRS-80™ . . . anywhere!

TRS-80 is a trademark of the Radio Shack Division of Tandy Corporation

**Don't Delay. . Call Today**



✓ 189

### SALES COMPANY

1412 WEST FAIRFIELD DR.

P.O. BOX 8098 PENSACOLA FL 32505

904/438-8507

nationwide 1-800-874-1551

### Program continued

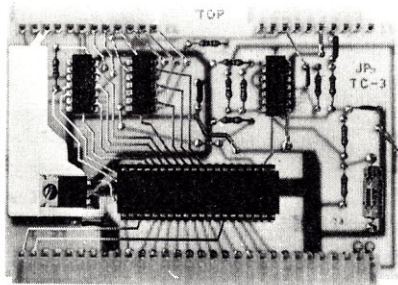
0151	9663	LDA A	\$63	(restore byte onto screen
	DE32	LDX	\$32	
	AD00	JSR	X	
	01	NOP		
	01	NOP		
	01	NOP		
	01	NOP		
	01	NOP		
	01	NOP		
	B6F404	LDA A	\$F404	(get keyboard input
0160	2B04	BMI	*+4	
	DE2E	LDX	\$2E	(process input
	AD00	JSR	X	
	B6F406	LDA A	\$F406	(cursor request?
	841F	AND A	=\$1F	
	2714	BEQ	*+20	
	36	PSH A		(save cursor request on stack
	966C	LDA A	\$6C	
0170	2606	BNE	*+6	
	966B	LDA A	\$6B	
	DE32	LDX	\$32	(store pixel on screen
	AD00	JSR	X	
	32	PUL A		(get back cursor request
	DE34	LDX	\$34	
	AD00	JSR	X	
	DE30	LDX	\$30	(save screen byte
017F	AD00	JSR	X	
	9663	LDA A	\$63	(store pixel on screen
	43	COM A		
	DE32	LDX	\$32	
	AD00	JSR	X	
	8680	LDA A	=\$80	(delay
	DE26	LDX	\$26	
	AD00	JSR	X	
018E	20C1	BRA	0151	(loop back
0193	9716	STA A	\$16	(store color byte
	8410	AND A	=\$10	(isolate bit 4
	47	ASR A		(move down to bit posn 0
	47	ASR A		
	47	ASR A		
	47	ASR A		
	9717	STA A	\$17	(store temporarily in 17
	9616	LDA A	\$16	(get compliment of bit 0
	43	COM A		
01A0	8401	AND A	=\$01	
	48	ASL A		(move up to bit posn 1
	9A17	OR A	\$17	(combine with earlier bit
	9717	STA A	\$17	(store pixel code in 17
	48	ASL A		
	48	ASL A		
	9A17	OR A	\$17	(make two pixels
	9717	STA A	\$17	
	48	ASL A		
	48	ASL A		
	48	ASL A		
01B0	48	ASL A		
	9A17	OR A	\$17	(make four pixels
01B3	39	RTS		
01B8	D662	LDA B	\$62	(y-coord
	46	ROR A		
	2403	BCC	*+3	
	5A	DEC B		(↑
	2004	BRA	*+4	
01C0	46	ROR A		
	2407	BCC	*+7	
	5C	INC B		(↓

More →



JPC PRODUCTS FOR

# 6800 COMPUTERS



## High Performance Cassette Interface

- **FAST** - 4800 Baud Loads 4K in 8 Seconds!
- **RELIABLE** - Error Rate Less Than 1 in 10<sup>6</sup> Bytes.
- **CONVENIENT** - Plugs Directly Into The **SWTPC**.
- **PLUS** - A Fully Buffered 8 Bit Output Port Provided.
- **LOW COST** - \$59.95 For Complete Kit.

- **OPTIONAL** - CFM/3 File Manager.

Manual & Listing \$19.95  
(For Cassette Add) \$ 6.95

TERMS: CASH, MC or VISA;

Shipping & Handling \$3.00



JPC PRODUCTS CO.

Phone (505) 294-4623

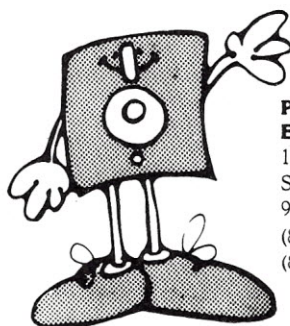
✓ 92

12021 Paisano Ct.

Albuquerque, N.M. 87112

# MEMOREX FLEXIBLE DISCS

BUY THE BEST FOR LESS.  
Lowest prices. **WE WILL NOT  
BE UNDERSOLD!!** Buy any  
quantity. Call free (800) 235-  
4137 for prices and information.  
Dealer inquiries invited. C.O.D.'s  
accepted.



**PACIFIC  
EXCHANGES** ✓ 172  
100 Foothill Blvd.  
San Luis Obispo, CA  
93401. In Cal. call  
(800)592-5935 or  
(805)543-1037



# KB BOOK NOOK

## FOR TRS-80\* OWNERS ONLY!

## THE NEWEST PERIPHERAL FOR THE TRS-80\*

The **Encyclopedia for the TRS-80\***, published by Wayne Green Books, is a ten-volume reference work that is absolutely packed with programs and articles carefully selected to help you make the most of your microcomputer. The volumes of the Encyclopedia can be considered an extension of the documentation that came with the TRS-80\*, offering a continual supply of information and ideas that will help you realize the full potential of your TRS-80\*. Each volume contains material on programming techniques, business, games, tutorials, utilities, and interfacing.

Unlike conventional encyclopedias, the **Encyclopedia for the TRS-80\*** will never become stale or out of date. That's because the volumes of the Encyclopedia are being issued one at a time, over a period of months. This means that each new volume will reflect the latest developments and discoveries, making this a living encyclopedia for TRS-80\* users.

Here's a sample of what's included in Volume 1:

- **Four Graphics Methods.** Improved techniques for dealing with the TRS-80's low resolution graphics.
- **TTY Interface.** Build an interface, hookup a Teletype to a TRS-80.
- **The President Decides.** A thrilling simulation that lets you make decisions as if you were President of the United States.
- **Measure Instructional Effectiveness.** Many programs teach or tutor: this one helps determine the effectiveness of the lessons.
- **The Invoice.** A program for small businesses which produces custom invoices.
- **Punch Out Your Disks.** Double your disk storage in seven easy steps.

\*TRS-80 is a trademark of the Radio Shack Division of Tandy Corp.

### ORDERING INFORMATION

HARDCOVER SERIES			SOFTCOVER SERIES		
EN8101	VOL. 1	19.95	EN8081	VOL. 1	10.95
EN8102	VOL. 2	19.95	EN8082	VOL. 2	10.95

\*Use the order card in the back of this magazine or itemize your order on a separate piece of paper and mail to Kilobaud *Microcomputing* Book Department • Peterborough NH 03458. Be sure to include check or detailed credit card information.

No C.O.D. orders accepted. All orders add \$1.50 handling. Please allow 4-6 weeks for delivery. Questions regarding your order? Please write to Customer Service at the above address.

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

**FOR TOLL FREE ORDERING CALL 1-800-258-5473**



# No.2 UNBELIEVABLE OPPORTUNITY!

If You've Written an  
Outstanding Program--  
We'd Like to Publish It!

We're looking for EDUCATION

## Programs:

SPECIAL EDUCATION/AID  
TO THE HANDICAPPED  
MULTI-MEDIA COMPUTER INSTRUCTION  
TEACHER-AUTHORING LANGUAGES  
MANAGEMENT TRAINING  
SIMULATIONS

Earn money while helping others.  
Write for our free Programmer's  
Kit today!

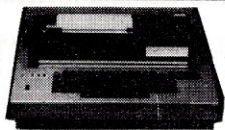
INSTANT SOFTWARE, INC.

Submissions Dept. ✓75

Peterborough, NH 03458

## SURPLUS ELECTRONICS

ASCII



ASCII

TRS-80\* COMPATIBLE,  
IBM SELECTRIC®-BASED  
I/O TERMINAL with  
ASCII conversion installed: \$645.00

Many Other Items Available:

Tape Drives; Cable;

Cassette Drives; Wire; Power Supplies (5 volt 35  
amp, others); Displays; Cabinets; Transformers;  
Heat Sinks; Printers; Components.

Send for free catalog.

WORLDWIDE ELECT. INC.

130 Northeastern Blvd.

Nashua, NH 03062 ✓122

Phone orders accepted using

VISA or Master Charge

TOLL FREE 603-889-7661 • 1-800-258-1036

TRS-80 is a trademark of the Radio Shack Division of Tandy Corporation.

## MEMOREX FLEXIBLE DISCS

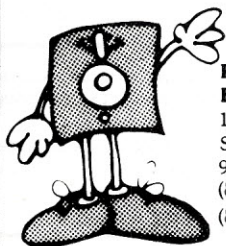
WE WILL NOT BE UNDER-

SOLD!! Call Free (800)235-4137

for prices and information. Dealer

inquiries invited and C.O.D.'s

accepted.



PACIFIC  
EXCHANGES

100 Foothill Blvd.  
San Luis Obispo, CA  
93401. In Cal. call  
(800)592-5935 or  
(805)543-1037 ✓172

Program continued

	C43F	AND B	=\$3F	(wrap around if off screen
	D762	STA B	\$62	
	201A	BRA	*+26	
	D661	LDA B	\$61	(x-coord
	46	ROR A		
	2403	BCC	*+3	
	5A	DEC B		(←
01D0	2004	BRA	*+4	
	46	ROR A		
	2407	BCC	*+7	
	5C	INC B		(→
	C47F	AND B	=\$7F	(wrap around if off screen
	D761	STA B	\$61	
	2008	BRA	*+8	
	46	ROR A		
	2405	BCC	*+5	
	5F	CLR B		( home
01E0	D761	STA B	\$61	
	D762	STA B	\$62	
01E4	39	RTS		
01EB	CED000	LDX	=\$D000	(screen start
	DF10	STX	\$10	
01F0	D662	LDA B	\$62	(y-coord
	270F	BEQ	*+15	
	9611	LDA A	\$11	(add 32 to 10,11
	8B20	ADD A	=\$20	
	9711	STA A	\$11	
	9610	LDA A	\$10	
	8900	ADC A	=\$00	(note any carry
	9710	STA A	\$10	
0200	5A	DEC B		(do this y-coord times
	26F1	BNE	*-15	
	9661	LDA A	\$61	(x-coord
	47	ASR A		(divide by 4
	47	ASR A		
	9B11	ADD A	\$11	(add to 10,11
	9711	STA A	\$11	
	9610	LDA A	\$10	
	8900	ADC A	=\$00	(not any carry
020F	9710	STA A	\$10	
	9661	LDA A	\$61	(mask address is found by
	8403	AND A	=\$03	(checking x-coord bits 0,1
	8B64	ADD A	=\$64	(mask table starts at 64
	9713	STA A	\$13	(store mask address in 13
	4F	CLR A		
	9712	STA A	\$12	(actual mask into 13
	DE12	LDX	\$12	
	A600	LDA A	X	
0220	9713	STA A	\$13	
0222	39	RTS		
0229	9717	STA A	\$17	(string start into 16,17
	4F	CLR A		
	9716	STA A	\$16	
	DE16	LDX	\$16	
0230	A600	LDA A	X	(get next string ch
	270C	BEQ	*+12	
	08	INX		
	DF16	STX	\$16	(restore updated string ptr
	DE10	LDX	\$10	(get screen byte address
	A700	STA	X	(store ch on screen
	08	INX		
	DF10	STX	\$10	(update screen ptr
	20EE	BRA	*-17	
0240	39	RTS		
0247	9719	STA A	\$19	(save pixel byte

More →



Program continued

	DE30	LDX	\$30	
	AD00	JSR	X	(get screen byte, address and mask
	9663	LDA A	\$63	
	01	NOP		
0250	01	NOP		
	9413	AND A	\$13	(remove pixel
	9714	STA A	\$14	
	9613	LDA A	\$13	
	43	COM A		
	9419	AND A	\$19	(isolate pixel to be stored
	9A14	OR A	\$14	(put into byte
	0F	SEI		(stop peripheral ints
	F6F406	LDA B	\$F406	(wait until horiz sync
0260	2AFB	BPL	*-4	
	F6F406	LDA B	\$F406	
	2BFB	BMI	*-4	
	A700	STA A	X	(store byte on screen
	0E	CLI		(allow interrupts
026A	39	RTS		
0271	9660	LDA A	\$60	(background four pixels
	CED000	LDX	=\$D0000	(screen start
	A700	STA A	X	
	08	INX		
	8CD800	CPX	=\$D800	(end of screen?
	26F8	BNE	*-12	
027E	39	RTS		
0285	4A	DEC A		(millisecond count
	270B	BEQ	*+11	
	8D02	BSR	*+2	
	20F9	BRA	*-6	
	37	PSH B		(main 1 milli loop
	C68F	LDA A	=\$8F	
	5A	DEC B		
0290	26FD	BNE	*-3	
	33	PUL B		
0293	39	RTS		
0298	DE2C	LDX	\$2C	(get screen address & mask
	AD00	JSR	X	
	DE10	LDX	\$10	
	0F	SEI		(interrupts off
029F	B6F406	LDA A	\$F406	
	2AFB	BPL	*-5	
	B6F406	LDA A	\$F406	
	2BFB	BMI	*-5	
	A600	LDA A	X	(load screen byte
	9763	STA A	\$63	
	0E	CLI		(allow interrupts
02AE	39	RTS		
02B4	8143	CMP A	=\$43	("C" cursor-skip
	2604	BNE	*+4	
	976C	STA A	\$6C	
	2035	BRA	*+53	
	8151	CMP A	=\$51	("Q" quit this picture
	2608	BNE	*+8	
02C0	86BF	LDA A	=\$BF	
	B7F441	STA A	\$F441	
	7E0100	JMP	\$0100	
	811B	CMP A	=\$1B	("Esc" back to monitor
	2608	BNE	*+8	
	86BF	LDA A	=\$BF	
02CE	B7F441	STA A	\$F441	
	7EFAD7	JMP	\$FAD7	
	8153	CMP A	=\$53	("S" save picture
	2606	BNE	*+6	
	DE36	LDX	\$36	
	AD00	JSR	X	

More

# CHIPS & DALE

Specializing in memory Chips

## THE INFLATION FIGHTERS!

By carrying a Specialized Product Line; we are able to get large discounts through volume buying. These savings are passed on to you!

**\*We buy from Manufacturer's Authorized Distributors. All Chips are fully Guaranteed.**

**\*Also we won't carry any quality product unless we're able to provide prompt service at rock bottom prices.**

### — RAM —

4116 200ns 8/\$14.00

2114L 300ns 8/\$18.45

4164 200ns \$22.00

### — EPROM —

2716 (5v)450ns 8/\$4.25 ea. \$4.50 ea.

2732 (5v)450ns 8/\$11.00 ea. \$11.50 ea.

**NEW Products Coming**  
74LS series  
CMOS 4000 series

Call for quantity pricing

Please allow up to 3 wks. for  
Personal checks to clear

Master charge  
VISA accepted.

Add \$2.50 Shipping & Handling  
C.O.D. \$3.00, Wash. residents add  
5.4% Sales Tax

**CHIPS & DALE** ✓170  
P.O. BOX 31607, DEPT M  
Seattle, Washington  
Zip 98103

1-206-524-9126

**CHIPS & DALE**  
Specializing in memory Chips



Program continued

	2013	BRA	*+19	
	814C	CMP A	=\$4C	("L" load picture
02E0	2606	BNE	*+6	
	DE38	LDX	\$38	
	AD00	JSR	X	
	2009	BRA	*+9	
	5F	CLR B		(must be color request
	D76C	STA B	\$6C	(clear cursor-skip
	DE2A	LDX	\$2A	
	AD00	JSR	X	
02EF	976B	STA A	\$6B	(store current color
02F1	39	RTS		
02F8	CED000	LDX	=\$D000	(screen start
	DF10	STX	\$10	
	DE6D	LDX	\$6D	(save area start
02FF	DF12	STX	\$12	
	DE10	LDX	\$10	(get next screen byte
	8CD800	CPX	=\$D800	(end of screen?
	270E	BEQ	*+14	
	A600	LDA A	X	
	08	INX		
	DF10	STX	\$10	
	DE12	LDX	\$12	
030F	A700	STA A	X	
	08	INX		
	DF12	STX	\$12	
	20EB	BRA	*-20	
0316	39	RTS		
0317	CED000	LDX	=\$D000	(screen start
	DF10	STX	\$10	
	DE6D	LDX	\$6D	(save area start
	DF12	STX	\$12	
0320	DE12	LDX	\$12	(get saved byte
	A600	LDA A	X	
	08	INX		
	DF12	STX	\$12	
	DE10	LDX	\$10	
	A700	STA A	X	(put byte onto screen
	08	INX		
	DF10	STX	\$10	
032E	8CD800	CPX	=\$D800	(end of screen?
	2DED	BLT	*-18	
0333	39	RTS		

placing the pixel into the byte and then storing the byte. Both accesses to memory have to wait for the screen horizontal-blanking period. Unless this is done, flecking occurs on the screen. Note that the call to the load-pixel subroutine has the effect of also loading addresses 0010,0011 with the screen byte address, and location 0013 with the pixel mask.

The clear the screen, 0271 through 027E, performs the task of placing the background color byte into all 2K screen-memory-mapped locations. You need not worry about waiting for the horizontal-blanking period in this subroutine.

0285 through 0293 contains the de-

lay subroutine, which causes a 1 ms delay for the number of times specified in accumulator A.

0298 through 02AE is a simple subroutine that gets the screen-address byte, waits for the horizontal-blanking period and then loads the byte.

The input-decode subroutine is at 02B4 through 02F1, and is described by the flowchart in Fig. 7. Note that only the special commands and the pseudo-color command are specifically tested for; any other input is assumed to be a color request and decoded accordingly. This subroutine is really a subcontrol routine, delegating input processing work to other subroutines.

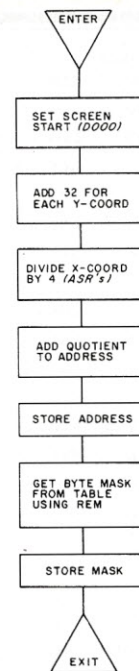


Fig. 5. Converting (x,y) to address and mask.

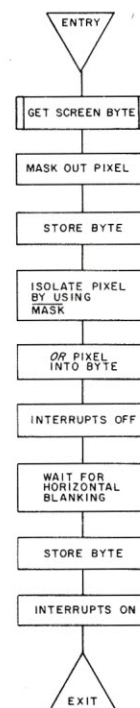


Fig. 6. Store pixel on screen.

The save-picture subroutine, 02F8 through 0316, is merely one loop that copies 2K from screen memory to another 2K block of memory.

0317 through 0333 performs the reverse operation of that in the save-picture subroutine. Note that there is no need to wait for horizontal synchronization in these two subroutines.

## Program Operation

This program is not meant to be a



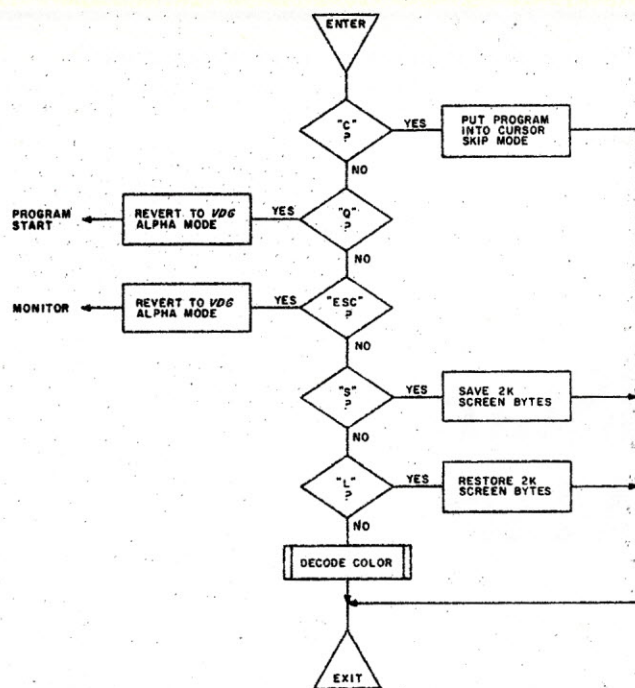


Fig. 7. Process input.

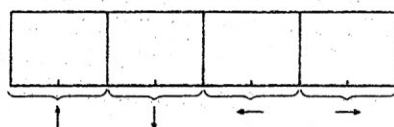


Fig. 8. Joystick byte coding.

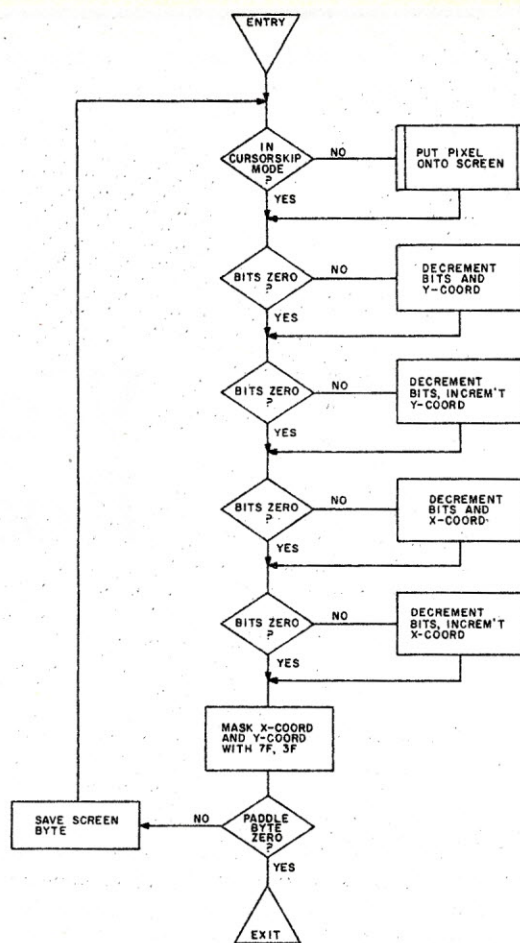


Fig. 9. Modified move cursor for paddle.

model of 6800 coding. In fact, it was our first program in 6800 machine code. It does, however, represent an interesting and colorful application for the TVBUG.

Once we got the basic program working, we found that it responded to the cursor-control keys with somewhat more enthusiasm than was really required. Thus we put in a delay subroutine and found that a delay of about 128 ms was about right. In the first instance we tried to use a flashing cursor by introducing two delays, one after restoring the pixel to the screen, the other after putting the pixel on the screen. However, we found the flashing cursor rather disconcerting and hence replaced the initial delay coding with no ops. If you wish to experiment with a flashing cursor, then apply the patches in Table 3.

We were disappointed with the color clarity of vertical lines, even at this reasonably low resolution. But it appears that this problem is due to the limited bandwidth of the color TV used, rather than TVBUG. A single vertical line is mostly a muddy indis-

tinct color, but horizontal lines are quite clear and very acceptable. The best approximation to the four colors that we could get with a vertical line was with a yellow background in the green color set. To get true colors in vertical lines, we needed to draw three lines together.

Although the program as it stands performs adequately, it is difficult to draw inclined or curved lines. This could be solved by implementing a joystick onto the system. Then, rather than use the cursor-control keypad to draw lines, pictures could be drawn by moving the joystick. The 360-degree movement would allow inclines and curves under easy user control.

Address	Byte
0157	86
0158	50
0159	DE
015A	26
015B	AD
015C	00
0189	50

Table 3.

The joystick input byte could possibly be coded as in Fig. 8, giving an increment value in the range 0 through 3 for each of the four directions currently used on the cursor-control keypad. Then the dotted box in Fig. 3 could be replaced by a call to a modified cursor-control movement routine, as in Fig. 9. Thus with a certain amount of hardware modification, the program would be somewhat easier to use.

In the same vein, the use of the GRYB keys on the keyboard is fine when in the green color set, but somewhat meaningless in the buff set. What would be better would be a separate pad with a four-key set with bisected tops, colored green and buff, red and orange, etc. One could imagine the final artist's electric "palette" being completely separated from the keyboard, and connected to the computer via a lead. The palette would contain color keys, control keys and a joystick, or perhaps our electric artist would even be equipped with a paintbrush in which a light pen was concealed. Eat your heart out, Van Gogh!



# WordStar RoadMap

By Charles R. Perelman

**W**ordStar is indeed the Cadillac of word processors, as Charles Platt says in the May 1981 issue ("Hot Rod Word Processors," p. 40). But the manual, though extensive and informative, has one serious lack: no index.

I've used WordStar for many applications, including a book exceeding 100 pages, and a quick reference guide is an absolute necessity. The index provided here saves me the frustration of calling various menus, and often still not finding the information I want. I've included the Mailmerge option.

I've also discovered a few tricks not covered in the manual which will help you get more out of the software. The controls mentioned here are for the TRS-80 Model II, so there may be some variation with other computers.

First, if you want to underline spaces as well as characters, don't use the embedded underline control in the same line, but instead overprint the spaces on the following line.

Second, on 96-character printwheels, you can get additional characters by pressing the control key and the digit 6, 9 or 0 at the same time. The manual does cover the ability to

obtain two additional characters with the Phantom Space (control-F) and Phantom Rubout (control-G).

Third, the F1 key sends out a control A and the F2 key a control B. You may find it quicker to move the cursor back one word with the F1 key and to reform paragraphs with the F2 key, rather than use two separate key strokes.

Fourth, to reformat an entire docu-

ment—as, for example, when you want to change the margins throughout—use the repeat function: control QQ, followed by control-B or F1 and number 1 for the fastest speed. You must be sure that Hyphen-help is off.

The index and these hints should significantly speed up your use of this fine word processing software, and reduce the training time for new users. ■

## Index to WordStar

Abandoning Edit 5-6, 6-5, 8-13	Changing Margins 8-21
Abandoning Print 11-5	Changing Pitch 10-2, 10-16
Adding a Carriage Return 6-1, 6-3	Changing Type Fonts 10-2, 10-16
Adding a Line 6-1, 6-3	Columnar Tables 8-10, 8-26, 8-27
Adding a Paragraph 8-10	Command File 16-2, 16-30
Adding a Word 6-2	Copying Files 5-11
Additional File Commands 8-44	Copying from a Block 8-42
Answering Questions 8-51	Correcting Entries 6-2
BAK file editing 12-4	Cursor Commands 8-2, 8-3, 8-4
Beginning Operation 3-3	Data Files for M-P 16-2, 16-7 to 16-10, 16-51
Beginning WordStar 5-2	Deleting a Block 8-41
Block Commands 8-43	Deleting a File 8-46
Block Copy 8-41	Deleting a Line 8-11
Block Delete 8-41	Deletion Command 8-11
Block Write to File 8-42	Directory Display 5-7
Boiler Plate 8-45, 16-2, 16-29	Disk Change 3-9, 9-4
Boiler Plate Variables 16-25, 16-26	Disk Full Problems 12-4
Boldface 10-1	Dot Commands 10-5 to 10-8
Bottom of Page Margin 10-14	Dot Commands for M-P 16-6, 16-8, 16-53, 16-54
Carriage Returns, Hard and Soft 4-2	Double Strike 10-1
Centering 8-19	Double Spacing 8-14
Changing Diskettes for M-P 16-31, 16-37	Editing BAK Files 12-4
Changing Disks 3-9, 9-4	Ending Edit 5-6, 6-5, 8-13

Address correspondence to Charles R. Perelman, A Professional Corporation, 9777 Wilshire Blvd., Suite 700, Beverly Hills, CA 90212.



Entering Variables M-P 16-13 to 16-18, 16-33  
 Envelope Addressing 16-22 to 16-34  
 Error Messages M-P 16-13 to 16-18, 16-49  
 File Insertion M-P 16-29 to 16-36  
 File Names 3-5  
 File Size 9-3  
 Find 8-30  
 Find and Replace 8-37  
 Find and Replace Options 8-32  
 Find and Replace Procedure 8-35  
 Find and Replace Special Characters 8-33  
 Find Controls—Special Finds 8-33  
 Finding Soft Hyphens 8-34  
 Flag Character Meanings 7-7  
 Footings 10-7, 10-12  
 Format for Form Letters 16-52  
 Formatted List of Data File 16-20  
 Formatting 8-14, 8-17  
 Form Letters 16-4  
 Hard and Soft Hyphens 8-25  
 Headings 10-7, 10-11  
 Help Commands 8-47  
 Hyphens 8-24, 8-25  
 Inserting Carriage Return 6-1, 6-3  
 Inserting Files M-P 16-29 to 16-36  
 Inserting Form Letter Variables 16-13 to 16-18, 16-33  
 Inserting Line 6-1, 6-3  
 Inserting Word 6-2  
 Inserting Paragraphs 8-20, 8-21  
 Inserting Variables M-P 16-2  
 Insert Off and On 6-1, 6-2  
 Installation, Files Required 3-8  
 Invoking Merge Print 16-11  
 Justification 8-21, 8-23, 11-1  
 Justification, Output 16-41, 16-42, 16-54  
 Label Printing 16-21  
 Left Margin—Printing 10-6, 10-14  
 Line Height Setting 10-15  
 Line Input Commands 9-2  
 Line Input Questions 8-51  
 Line Spacing 8-14  
 Lines Per Inch 10-15  
 Long File Problems 8-42, 8-46, 9-2, 9-3  
 Mailing Label 16-21  
 Margins 8-19, 8-21, 8-23, 8-26, 10-6, 10-14  
 Marking Blocks 8-40  
 Merge Print Data Files 16-2, 16-7 to 16-10, 16-51  
 Merge Print Dot Commands 16-6, 16-8, 16-53, 16-54  
 Merge Print Error Messages 16-47  
 Merge Print Form Letter Format 16-52  
 Merge Print Summary 16-50  
 Merge Print Variables 16-5, 16-50  
 Miscellaneous Commands 8-48, 8-50  
 Miscellaneous Dot Commands 10-9  
 Moving Text 8-39, 8-41, 8-46, 9-3  
 Multiple Copies M-P 16-3, 16-45  
 Multiple Jobs by M-P 16-34  
 Nondocument Commands 7-2, 9-5  
 Numbering Pages 10-12, 10-13  
 Omitting Form Lines M-P 16-23  
 Operator Data Entry M-P 16-13 to 16-18  
 Outline Format 8-22  
 Overprint 7-4, 8-17  
 Overprinting Characters 8-28, 8-17  
 Overprinting Lines 7-4, 8-17, 8-29  
 Page Breaks 10-6, 10-13  
 Page Footings 10-7, 10-12  
 Page Headings 10-7, 10-11  
 Page Numbers 10-12, 10-13  
 Paragraph Reform 8-21 to 8-23  
 Paragraph Reform M-P 16-38  
 Phantom Space or Rubout 10-3  
 Pitch 10-2, 10-16  
 Place Markers 8-38  
 Position of Text on Page 10-6, 10-14  
 Print Controls 10-1, 10-3  
 Print Formatting 10-5  
 Printing Data File M-P 16-20  
 Printing Envelopes 16-22  
 Printing File 11-3, 6-5  
 Printing, Merge Print 16-44 to 16-46  
 Printing Multiple Items 16-34  
 Print Time Formatting 16-39 to 16-44  
 Prompt Message 7-2, sec 12  
 Questions, Answering 8-51  
 Reading Data for Form Letters 16-8  
 Reformatting Paragraphs 8-21 to 8-23  
 Removing Diskette 3-9, 9-4  
 Renaming BAK files 12-4  
 Repeating Commands 8-48  
 Repeating Document M-P 16-19  
 Repeating Use of Same File 8-45  
 Replace 8-31  
 Reference Info M-P 16-50  
 Reprinting Selected Items 16-46  
 Ruler in Document 8-26, 8-27  
 Save and Re-edit 8-13  
 Saving Files 6-5  
 Screen Messages M-P 16-26 to 16-28  
 Scrolling Commands 8-7  
 Search 8-30  
 Search and Replace 8-37  
 Search and Replace Options 8-32  
 Search and Replace Procedure 8-35  
 Setting M-P Variables 16-25, 16-26  
 Setting Tab Lines in Document 8-26, 8-27  
 Size of File 5-10, 9-3  
 Soft Hyphens, Finding and Displaying 8-34  
 Spaces, Hard and Soft 4-3  
 Special Find Controls 8-33  
 Splitting a Paragraph 8-20  
 Starting M-P 16-11  
 Stopping M-P 16-45  
 Striking Over 7-4, 8-17  
 Subscript and Superscript 10-2  
 Summary of Dot Commands 10-10  
 Summary of Merge Print 16-50  
 Tabbing 8-10, 8-26, 8-27, 9-5, 9-6, 10-4  
 Tables 8-10, 8-26, 8-27  
 Temporary Data File 16-46  
 Temporary Margin Reset 8-23  
 Terminating Edit 5-6, 6-5, 8-13  
 Text Entry Commands 8-8  
 Top and Bottom Margins 10-14  
 Top of Page Setting 10-14  
 Turning Off Hyphen 6-6, 8-21, 8-24  
 Underline 10-1  
 Using M-P 16-44 to 16-46  
 Variables for Forms 16-25, 16-26  
 Variables for M-P 16-5, 16-50  
 Variable References M-P 16-6  
 Wide Lines 8-28



# Put to the Test By a Computer

By Leonard T. Meuer

**H**igh school students in the Travis, CA, Unified School District must pass a series of competency exams to graduate. Formerly, we used a standard and familiar system: students were given booklets, and blacked the appropriate spaces on corresponding answer sheets. But while the scoring agency was able to handle the scoring of the major categories—reading, writing and math—it was unable to score the subcategories without extensive reprogramming and cost. So we decided to switch to an alternative system, using three Commodore PETs.

The new alternative system uses the same general instructions and questions as the paper-and-pencil exams. A student sits down at the microcomputer and the exam is started by a staff member. Instructions are presented on a cleared video display. The student types in his or her name and number, and the questions are presented one at a time.

The student presses a 1, 2, 3, 4 or 5 for his choice. Since wrong answers are not counted against the student, he is encouraged and must respond to go on to the next question. Upon pressing the number of his choice the next question is presented.

The computer will only respond when 1, 2, 3, 4 or 5 is pressed. After

completing all questions a student is thanked by the computer and instructed to report to his normal assigned place, and told that he will later be contacted by his counselor with the results.

All three exams are on one disk, which is write-protected. The program runs on 16K machines. Student responses are automatically recorded on a second disk. Scoring is done by yet another program, for security reasons. One disk will hold the scores for a minimum of 500 students.

A student cannot call up a program without the proper passwords. Immediately upon completion of an exam, it is cleared from the computer. He cannot self-score or list the program, or scan it for the answers. Since all programs of the system are disk-based, security is tightened by placing the disk in a locked metal file along with the backup disks.

## Conclusions

Students that tried the exams liked it. They felt more motivated even though the questions were the same as the written version. They felt that the process was much less tedious and time-consuming because of not having to blacken in the silly little squares on the answer sheets, and they didn't have to be concerned

with putting their answer in the wrong block, making it black enough or having smudges on the answer sheet.

Since questions are presented only one at a time, a student's concentration doesn't wander to other questions. A student does his or her own work because he or she doesn't have someone else's answer sheet to look at. Visually or physically handicapped students were able to progress through the exams without special attention.

From the pre-pilot and pilot information gathered we feel that the administering of competency exams by computer is a valid alternative method of administering the exams, and that it provides a method of meeting special needs. The scoring programs used provide the necessary information without superfluous markings on the answer scoring sheets. Standard exams can also be scored in the same format by using an answer sheet reader attached to the microcomputer system. Thus, a one-time capital outlay (less than the cost of sent-out scoring) results in considerable dollar and time savings. ■

---

*Address correspondence to Leonard T. Meuer,  
1790 Burbank Court, Fairfield, CA 94533.*

---



AAFW WRITING 7-14-81  
 AAFW 1  
 OVER-ALL SCORE = 90.90908 %  
 TOTAL ELAPSED TIME = 637

1	FIND INCOMPLETE SENT.	1*
2	FIND INCOMPLETE SENT.	2*
3	FIND INCOMPLETE SENT.	3*
4	FIND INCOMPLETE SENT.	1*
5	FIND COMPLETE SENT.	2*
6	FIND COMPLETE SENT.	1*
7	FIND COMPLETE SENT.	4*
8	FIND COMPLETE SENT.	2* 100 % ON COMP# 01
9	END PUNCTUATION	2*
10	END PUNCTUATION	3*
11	END PUNCTUATION	1*
12	END PUNCTUATION	2*
13	SPELLING-E SOUND	2*
14	SPELLING-E SOUND	4*
15	SPELLING-K SOUND	3*
16	SPELLING-PLURAL	1*
17	SPELLING-F SOUND	1*
18	SPELLING-PLURAL	2*
19	SPELLING-ADD LY	4*
20	SPELLING-COMPOUNDS	3*
21	SPELLING-ADD ING	1*
22	SPELLING-ADD ING	2*
23	SPELLING-ADD ITY	1*
24	SPELLING-ADD ED/ING	2
25	SUBJECT-VERB AGREEMENT	2*
26	SUBJECT-VERB AGREEMENT	2*
27	SUBJECT-VERB AGREEMENT	1*
28	SUBJECT-VERB AGREEMENT	1*
29	SUBJECT-VERB AGREEMENT	3*
30	SUBJECT-VERB AGREEMENT	3*
31	SUBJECT-VERB AGREEMENT	1
32	SUBJECT-VERB AGREEMENT	4*
33	WORD CAPITALIZATION	4*
34	WORD CAPITALIZATION	3*
35	WORD CAPITALIZATION	2*
36	WORD CAPITALIZATION	1*
37	PUNCTUATION-COMMAS	1*
38	PUNCTUATION-COMMAS	4*
39	PUNCTUATION-COMMAS	4*
40	PUNCTUATION-COMMAS	1*
41	APOSTROPHES-CONTRACT	3*
42	APOSTROPHES-CONTRACT	2
43	APOSTROPHES-CONTRACT	2*
44	APOSTROPHES-POSSESS	4 88.888889 % ON COMP# 02

Sample results from the computerized writing competency exam.

#### S-100 STATIC MEMORY BOARDS

(Top Quality, 1 Year Limited Warranty)

	A&T (4MHZ)	BARE BOARD & MANUAL	KIT* W/O MEM CHIPS
8KX8 ..... (SRA8)	\$179	\$30	\$65
16KX8 ..... (SRA16)	\$329	\$30	\$75
16KX8 ..... (ESRA16)**	\$369	\$35	\$80
32KX8 ..... (ESRA32)**	\$659	\$35	\$90

\*Needs only memory chips to complete. SRA8 uses 1KX1 chips s.a. 2102, while SRA16, ESRA16 & ESRA32 use 4KX1 chips s.a. TMS4044.

\*\*ESRA16 & ESRA32 have extended addressing and bank-select capabilities.

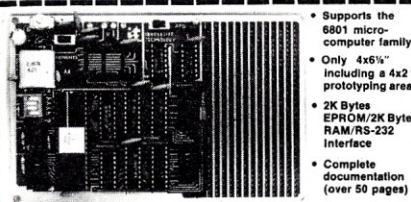
Also available, static memory chips 2102AL-2 (1KX1, 250 ns), \$1.45 each or \$11 for 8; TMS40L44-25 (4KX1, 250 ns, low power) \$8.75 each or \$66 for 8. IC Sockets, low profile, 16 pins, TIN - \$1.25 for 8; GOLD - \$3.50 for 8.

TERMS: Check, money order, VISA, MC or C.O.D. with 20% deposit. Minimum order \$20. Add 5% for shipping (\$3 min.), excess refunded. Calif. residents add 6% sales tax.

24 Hours Order Phone: (213) 375-6407

**LINCA INDUSTRIES, INC.** ✓ 84

4405 VIA PAVION, PALOS VERDES EST., CA 90274



#### MC6801 APPLICATIONS PROTOTYPE BOARD

The APB is a small board which supports the MC6801 family of microcomputers. It is described in Motorola's application note AN799. A typical 6801 member contains an enhanced 6800 processor, 2K bytes of ROM, 128 bytes of RAM, a 16-bit programmable timer, parallel I/O, and a serial communications interface. In addition to the resources of the 6801, the APB provides an additional 2K bytes of EPROM (TM52716), 2K bytes of RAM (2114L), and a full duplex RS-232 interface. It also supports special versions such as the 6801G1 with its LILBUG\* monitor, and provides on-board programming of the 6801 EPROM version.

The APB is an excellent educational aid which allows for evaluation and familiarization of 6801 family members. It is great for prototype development. Since the nuts and bolts are already in place, the designer need only add the necessary interface circuits for a particular application. It can also be used as a simple cost-effective dedicated controller for those limited quantity applications.

Besides being so practical, it is a fun little board. Order yours today!

TM of Motorola Semiconductor Products, Inc.

APB-1 Bare board with documentation .....	\$ 19
APB-2 Above assembled with all parts less microcomputer and memory .....	\$ 69
APB-3 Above with MC6801G1 and LILBUG manual .....	\$109
APB-4 Above with four 2114L RAMs .....	\$129

For the \$8-30 Bus:

AD-68A A/D Converter - 8 channels, 8 bit, 0-2.5V input, 6ms conversion time .....	\$39 A&T
CI-68A Control Interface - 8 opto-isolated inputs, 8 reed relay outputs .....	\$79 kit, \$98 A&T

Terms: Check, MO, VISA, or MC. In US and Canada add \$3 per item for shipping. Others add \$7 per item. US funds only. TX add 5% tax. Shipped from stock to two weeks.



**INNOVATIVE TECHNOLOGY**  
 510 Oxford Park  
 Garland, TX 75043 (214) 270-8393

## SUPERBRAIN®



64K Double or Quad Density units available. Uses two Z-80 CPU's. Commercial-type terminal with 12" monitor. Dual double density minifloppies. Over 350 kilobytes of storage (twice that with quad density drives). Two serial RS232 ports, I/O ports standard.

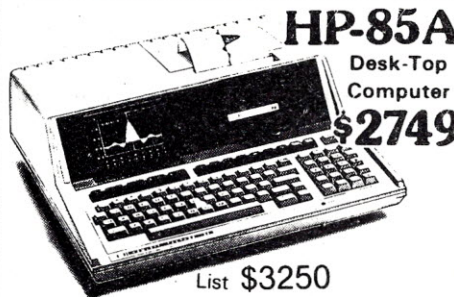
Comes with CP/MTM 2.2 operating system. MiniMicroMart can supply a wide range of CP/M development and application software.

w/64K Double Density, List \$3495 ... \$2869  
 w/64K Quad Density, List \$3995 ... \$3395



**hp HEWLETT  
 PACKARD**  
**HP-41CV**  
**\$259**

**HP-41C**  
**\$189**



**HP-85A**  
 Desk-Top  
 Computer  
**\$2749**

List \$3250

**new HP-125...\$3149**



**data  
 systems**

Z19 Video Terminal

List \$995



**Limited time**  
**\$799**

F.O.B. shipping point. All prices subject to change and all offers subject to withdrawal without notice. Advertised prices are for prepaid orders. Credit card and C.O.D. 2% higher. C.O.D. may require deposit.

— WRITE FOR FREE CATALOG — ✓ 304

**Mini MicroMart, Inc.**

943 W. Genesee St.  
 Syracuse, N.Y. 13204  
 [315] 422-4467



# Compiled vs Interpreted BASIC

By Murray L. Lesser

One of the advantages of using a compiled BASIC is that you can easily extend the language to suit your own needs by using assembly-language subroutines. Such language extensions operate like built-in functions: you call them by name, along with the BASIC variables to be operated upon.

As an example of how this works, I'll give two such added functions, along with a pair of system utilities that use them. All examples are written for Microsoft's BASCOM (the compiler version of BASIC-80) running under CP/M, but you can modify them to suit your own system.

The first subroutine, PICKUP, makes a BASIC string variable out of the rest of the CP/M "command line" that was keyed in along with the program call. This lets you pass variable information to the program as part of the original keyed-in calling sequence.

The second function, SCRAM, is a substitute for BASIC's RUN or CHAIN commands. The difference is that SCRAM allows you to specify the complete CP/M command line as a string variable, to be operated on by CP/M's console command processor as if you had keyed in the line. SCRAM is especially useful in chaining to system programs requiring an extensive command sequence.

The two subroutines are written for Microsoft's Macro-80 assembler, to link with BASCOM compilations using the LINK-80 linking loader. I have used Zilog mnemonics to make use of Z-80 instructions not available in the 8080, the most important of which is the block move, LDIR.

If your CPU chip is an 8080 or 8085,

you must find another way to perform the non-8080 instructions, such as writing a program loop to substitute for LDIR. You will also have to transliterate into Intel mnemonics if you want the assembler to catch the errors when you try to use instructions that cannot be executed. (For help in the translation, see, for example, Kathe Spracklen's book, *Z-80 and 8080 Assembly Language Programming*.)

## Passing Parameter

Before I discuss the subroutines, it might be well to consider the manner in which variables are "passed" between the BASIC program and an assembly-language subroutine.

You have to tell the subroutine where to find the variables it is to use. You do this as part of the CALL statement. Imagine a subroutine, named DOESIT, that expects to get two variables, do something with them and return the result. Suppose the two variables DOESIT does it to are ALPHA and BETA, and the result (which has to have a name so you can use it later in the BASIC program) is GAMMA. All you write in the BASIC program is: CALL DOESIT(ALPHA,BETA, GAMMA).

The subroutine can't read your BASIC program, but Microsoft has a convention for passing parameters. This is given in Microsoft's BASIC-80 (release 5.0) reference manual, Appendix C, but a little review won't hurt.

When the compiler and link-loader do their stuff with the CALL command, the addresses of the variables are passed to the subroutine. These are the same addresses that would be returned to you if you had used the

VARPTR function for those variables and stayed in BASIC. On subroutine calls, the addresses are passed in the internal registers of the CPU chip. For three or fewer variables, the address of the first named variable in the calling statement will be in register pair HL, the second in DE and the third in BC. (For more than three variables, you had better study Appendix C very carefully.)

Once the subroutine has these addresses, it has to know—in great detail—what to do with them. There is nobody but you to check for mismatched types and other such syntax errors. You must know what kind of variable to expect, as well as its internal representation, before you can write the subroutine.

What follows will be kept simple. Since I find compiled BASIC adequate for number crunching, I haven't had any need to write subroutines involving floating-point variables (which have the hardest internal representation to understand). So from here on in, we will consider only string variables. For the two subroutines in this article, we will consider only one string variable per subroutine.

For a string variable, the address passed in register pair HL (if there is only one) points to a block of three consecutive bytes in RAM. The number in HL is the address of the first byte, which contains the count (in binary) of the number of characters in the string. The next two bytes of this

---

Address correspondence to Murray L. Lesser, c/o Microcomputing.

---



string pointer contain the starting address of the actual string. Thus, the subroutine gets a pointer (address) pointing to a string pointer, which points to the string itself.

Each time BASCOM finds a newly-named string variable during the compilation, it sets up a string pointer in the data segment (DSEG) of the program space. If the string is a *literal* (that is, a string embedded in the program text), the BASCOM compiler will put it in DSEG and enter its location in the string pointer. However, if the string is a variable to be obtained from an INPUT statement, or from operating on other string variables or literals, BASCOM will initialize the string pointer to all zeros.

The first time you execute a command giving a value to that string variable, the actual string will be written in string space—the available RAM not taken up by your program or by BASIC's stack—and the string pointer will be changed to suit. If you change the value of that same-named string variable later in the executed program, the new string will be written somewhere else in string space, and the address in its string pointer will be changed again. Continued reuse keeps filling up string space, leaving garbage (no longer valid strings) laying around in RAM. When things get tight, the BASIC storage manager does a clean-up job to salvage all that abandoned space.

## The Subroutines

The two subroutines shown here take advantage of the procedure CP/M uses in loading a program. CP/M has a section known as the command control processor (CCP), which is used only for interpreting the initial calls you make on the system from the keyboard. CCP is considered to be expendable by any program. For example, the BASIC storage management routine (that was linked with your program from the system library, BASLIB.REL) starts building the stack down from where CCP ended, and string space up from where your program space ended.

BASIC always knows where to put its stack. The lowest address used by the permanent part of CP/M—the basic disk operating system (BDOS) entry address—can be found in zero-page locations 0006 and 0007. You will have to take my word for this, because if you load in DDT (or any other monitor that writes over CCP)

```

1                               TITLE    PICKUP
2
3                               ;Written by M. L. Lesser 10-25-80 (rev. 2-28-81)
4                               ;Written in Zilog Z80 mnemonics.
5                               ;Assembled with Microsoft MACRO-80 release 3.36.
6
7                               ;PICKUP is to be linked with a BASCOM program. It
8                               ;moves the rest of the command line to a string
9                               ;literal available to the program.
10
11      0000      BASE      EQU 0000      ;Standard CP/M location
12      0080      TBUF     EQU BASE + 80H
13
14      0000'
15      0000' 36 00      PICKUP::      ;Entry point
16      0002' 11 0000"    LD (HL),0      ;Set pointer to zero length
17      0005' 23          LD DE,TEMP      ;Address of string literal
18      0006' 73          INC HL          ;Store address of string
19      0007' 23          LD (HL),E      ; in string pointer
20      0008' 72          INC HL
21      0009' 3A 0080     LD A,(TBUF)     ;Check string length
22      000C' FE 00      CP 0            ;Is it zero?
23      000E' C8          RET Z          ;If so, return
24      000F' 06 00      LD B,0          ;Put string length in BC
25      0011' 4F          LD C,A
26      0012' 11 0080     LD DE,TBUF     ;tbuf address in DE
27      0015' 13          BLANK: INC DE   ;Skip leading blank
28      0016' 1A          LD A,(DE)      ;Check next character
29      0017' FE 20      CP ' '          ;Is it a blank?
30      0019' 20 04      JR NZ,MOVE     ;If not, move string
31      001B' 0D          DEC C          ;If so, reduce count
32      001C' C8          RET Z          ;Return if zero count
33      001D' 1B F6      JR BLANK        ;Else try again
34      001F' 2B          MOVE: DEC HL   ;Restore string pointer
35      0020' 2B          DEC HL        ; in HL
36      0021' 71          LD (HL),C     ;Store string length
37      0022' EB          EX DE,HL     ;Source address to HL
38      0023' 11 0000"    LD DE,TEMP   ;Sink address in DE
39      0026' ED B0      LDIR          ;Block-move string
40      0028' C9          RET
41
42      0029'
43      0000"
44
45      Symbols:
46      BASE      0000      BLANK  0015'  MOVE  001F'  PICKUP  0000I'
47      TBUF      0080      TEMP   0000"
48
49      BASE      11#      12
50      BLANK     27#      33
51      MOVE      30      34#
52      PICKUP    14#
53      TBUF      12#      21      26
54      TEMP      16      38      43#

```

Listing 1. PICKUP subroutine [all examples are written for Microsoft's BASCOM running under CP/M].

Listing 2. SCRAM subroutine.

```

1                               TITLE    SCRAM
2
3                               ;Written by M. L. Lesser, January 17, 1981
4                               ;Written in Zilog Z80 mnemonics,
5                               ;Assembled with Microsoft MACRO-80 release 3.36
6
7                               ;SCRAM is to be linked with a BASCOM program.
8                               ;If SCRAM is used instead of the BASCOM RUN or
9                               ;CHAIN commands, it provides a pseudo "auto-load"
10                              ;by reloading the CCP and moving the string
11                              ;variable into the command buffer.
12                              ;Use SCRAM for chaining to system programs that
13                              ;require additional parameters.
14
15                              ;WARNING: ALL FILES OPENED BY THE BASIC PROGRAM
16                              ;MUST BE CLOSED BEFORE CALLING SCRAM
17
18                              ;NOTE: SCRAM will not operate correctly with a
19                              ;monitor (such as DDT) loaded under BDOS.
20
21      0000      BASE      EQU 0000      ;Standard CP/M location
22
23      ;Contents of zero-page locations used:
24      ;
25      0001      BOOTP     EQU BASE + 01 ;Pointer to WBOOT
26      0004      DRIVNO     EQU BASE + 04 ;Default drive number
27      0005      BDOS       EQU BASE + 05 ;Jump to BDOS entry
28      0080      TBUF      EQU BASE + 80H ;Start of temporary buffer
29
30      ;BDOS function used by SCRAM:
31      ;

```

More



Listing 2 continued.

```

32 001A          LODMA EQU 26          ;Set DMA Address
33
34 0011          NSECTS EQU 17 ;CCP on 16 sectors + 6 bytes!
35
36 0000'         SCRAM::              ;Entry point
37                                     ;Build dummy command line
38 0000' 7E      LD A,(HL)            ;Put length of string
39 0001' 32 0000" LD (DUMCOM),A      ; in dummy command line
40 0004' 06 00   LD B,0              ;Set up BC for block move
41 0006' 4F      LD C,A
42 0007' 23      INC HL              ;Put string address in DE
43 0008' 5E      LD E,(HL)
44 0009' 23      INC HL
45 000A' 56      LD D,(HL)
46 000B' EB      EX DE,HL            ;String address in HL
47 000C' 11 0001" LD DE,DUMCOM+1    ;Destination address in DE
48 000F' ED B0   LDIR                ;Move string to dummy line
49 0011'
50 0011' 31 0100 LD SP,TBUFF+80H     ;Use tbuff for stack
51 0014' 2A 0001 LD HL,(BOOTP)
52 0017' 16 00   LD D,0
53 0019' 1E 15   LD E,15H           ;Calculate CBIOS "HOME"
54 001B' 19      ADD HL,DE           ; address = WBOOT + 15H
55 001C' 22 0080" LD (HOMEP),HL     ;Pointer to HOME jump entry

56 001F' 1E 03   LD E,3             ;Calculate CBIOS "SELDISK"
57 0021' 19      ADD HL,DE           ; = HOME + 03
58 0022' 22 0082" LD (DISKP),HL     ;Pointer to SELDSK entry
59 0025' 1E 06   LD E,06           ;CBIOS "SETSEC" jump
60 0027' 19      ADD HL,DE           ; = SELDSK + 06
61 0028' 22 0084" LD (SECP),HL      ;Load pointer to entry
62 002B' 19      ADD HL,DE           ;READ = SETSEC + 06
63 002C' 22 0086" LD (READP),HL
64 002F' 2A 0006 LD HL,(BDOS+1)     ;Jump address to BDOS
65 0032' 11 F7FA LD DE,0F7FAH      ;CCP entry =
66 0035' 19      ADD HL,DE           ; BDOS entry - 806H
67 0036' 22 0088" LD (CPMBP),HL    ;Pointer to CCP entry
68 0039' 0E 00   LD C,0
69 003B' 2A 0082" LD HL,(DISKP)
70 003E' CD 0099" CALL CBIOS        ;Select Disk A
71 0041' 2A 0080" LD HL,(HOMEP)
72 0044' CD 0099" CALL CBIOS        ;Select track 0
73 0047' ED 5B 0088" LD DE,(CPMBP) ;Initial DMA address
74 004B' 06 11   LD B,NSECTS
75 004D' 0E 02   LD C,2            ;First sector to read
76 004F'
77 004F' D5      PUSH DE            ;Pseudo warm start
78 0050' C5      PUSH BC            ;Save DMA address
79 0051' 0E 1A   LD C,LDDMA        ;Save sector data
80 0053' CD 0005 CALL BDOS          ;Set DMA address
81 0056' C1      POP BC             ;Recall sector data
82 0057' C5      PUSH BC            ;Save it for later
83 0058' 2A 0084" LD HL,(SECP)
84 005B' CD 0099" CALL CBIOS        ;Set next sector
85 005E' 2A 0086" LD HL,(READP)
86 0061' CD 0099" CALL CBIOS        ;Read it in
87 0064' FE 00   CP 0
88 0066' 20 A9   JR NZ,SETUP        ;If error, try again
89 0068' C1      POP BC             ;Recall old sector data
90 0069' 05      DEC B              ;DEC sector count
91 006A' 28 09   JR Z,FINISH
92 006C' 0C      INC C              ;Next sector
93 006D' D1      POP DE             ;Recall old DMA address
94 006E' 21 0080 LD HL,80H
95 0071' 19      ADD HL,DE
96 0072' EB      EX DE,HL          ;Next DMA address
97 0073' 18 DA   JR LOAD
98 0075'
99 0075' 2A 0088" LD HL,(CPMBP)     ;Calculate CCP auto-load
100 0078' 11 0007 LD DE,7           ; entry = CPMB + 7
101 007B' 19      ADD HL,DE
102 007C' 11 0000" LD DE,DUMCOM     ;Image of Command Line
103 007F' EB      EX DE,HL          ;Set up for move
104 0080' 7E      LD A,(HL)
105 0081' 3C      INC A              ;Must move 'length' + 1
106 0082' 06 00   LD B,0
107 0084' 4F      LD C,A
108 0085' ED B0   LDIR                ;Move DUMCOM to Command Line
109 0087' 3E 00   LD A,0
110 0089' 12      LD (DE),A         ;Add null to Command Line

111 008A' 11 0080 LD DE,TBUFF
112 008D' 0E 1A   LD C,LDDMA
113 008F' CD 0005 CALL BDOS          ;Reset DMA address to tbuff
114 0092' 3A 0004 LD A,(DRIVNO)     ;Restore logged-on disk
115 0095' 4F      LD C,A
116 0096' 2A 0088" LD HL,(CPMBP)    ;Jump to CCP entry
117 0099' E9      JP (HL)
118
119
120 009A'         DSEG                ;Data Space
121 0000"         DUMCOM: DEFS 128    ;Image of Command Line
122
123 ;Pointers to CBIOS jump table:
124 ;
125 0080" 0000     HOMEP: DEFW 0      ;to "HOME"
126 0082" 0000     DISKP: DEFW 0     ;to "SELDISK"
127 0084" 0000     SECP: DEFW 0      ;to "SETSEC"
128 0086" 0000     READP: DEFW 0    ;to "READ"
129
130 ;Pointer to CCP entry (CPMB):
131 ;

```

More

to look at those locations, the monitor will change the pointer in them to its lowest permanent address.

Anything you type in after the system prompt goes to the CCP command buffer. This is the same buffer that would carry a prerecorded command on boot if you were using CP/M's auto-load feature. (See "For CP/M: Automatic Program Execution on Start-Up," by Jon Lindsay, *Microcomputing*, January 1981, p. 184.) When you type in the carriage return, CCP goes to work.

CCP considers everything in the command buffer ahead of the first blank to be the name of the program called. So it tries to load a ".COM" file with that same name into the "transient program area." If it finds the program and loads it, CCP puts the rest of the command line into CP/M's "temporary buffer" (tbuff), which starts at 0080H. The first byte in tbuff is the number (in binary) of valid characters moved. This is followed by the text, including that first blank. When CCP is done, it transfers control to the start of the program you just called. (For additional details, see the Digital Research manual, *CP/M Interface Guide*.)

PICKUP (Listing 1) makes a BASIC string literal out of that "rest of the command line" after stripping off the leading blank(s). It moves the remaining valid characters to a location within the subroutine itself and changes the string pointer to fit. If there was nothing in the command line after the program name, PICKUP will return a zero-length string to BASIC. As written, the subroutine assumes a standard CP/M with the zero-page origin at address 0000. If your CP/M has a zero-page offset, use that address for the value of BASE given in line 11.

You will notice two PICKUPS in the listing. The first, with the pseudonym "TITLE," is the name of the module. The Microsoft library manager utility, LIB-80, works with module names. The second PICKUP, the label with the two colons in line 14, is the entry point to the subroutine. The CALLs from BASIC programs are to entry labels. If any module has more than one entry point, you CALL whichever entry label is pertinent. I usually keep the module name and the main entry point name the same, to avoid confusing myself.

Unlike most programs running under CP/M, SCRAM (Listing 2) by-



## IEEE-488 BUS PERIPHERALS FOR PET/CBM, HP-85, AND OSBORNE-1

CONNECT TO PRINTERS, PLOTTERS,  
TERMINALS, MODEMS, AND THE  
TELEPHONE SYSTEM... USE YOUR  
COMPUTER AS A TERMINAL.

RS-232 OUTPUT ONLY \$129  
RS-232 INPUT/OUTPUT \$229  
RS-232 DUAL CHANNEL \$369  
TELEPHONE MODEM \$389  
... AND SOFTWARE TOO!!

FROM **TNW CORPORATION**

3351 Hancock St., San Diego CA 92110  
(714) 225-1040 • TWX 910-335-1194 • Source TCB 198  
✓318  
Full One Year Warranty • Visa/Mastercharge

## TAR HEEL SOFTWARE SYSTEMS

"Affordable Software for Small Business"  
PROUDLY ANNOUNCES

**REAL ESTATE BOOKKEEPING SYSTEM**  
a disk-based fully-integrated system including  
cash journal, general journal, tenant ledger,  
landlord ledger, monthly landlord statements,  
balance sheet, P & L statement by profit  
centers, and more, all for \$150 postpaid.  
(North Carolina orders add 4% sales tax.)  
Free continuing update service included.  
Minimum hardware: TRS-80 Model I, 32K,  
2 disk drives, line printer. Versions for  
TRS-80 Model II and III, Apple II and  
Commodore 2001 Series coming soon. Watch  
for announcement of other small business  
applications software in the months to come.



✓233

## TAR HEEL SOFTWARE SYSTEMS, INC.

536 S. LEXINGTON AVE. • P.O. BOX 340  
BURLINGTON, NORTH CAROLINA 27215

## NORTH STAR BUSINESS SOFTWARE

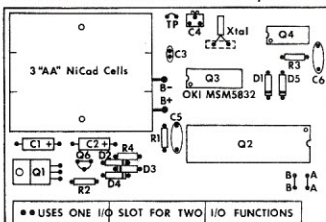
Our catalog lists over 20 business  
and utility programs for use on the  
North Star computer. We have the  
finest collection of business pro-  
grams available. No games are in-  
cluded. All programs are profession-  
ally written by experienced pro-  
grammers and come with complete  
documentation.

If you use your North Star for  
business purposes, you should have  
our free catalog. Drop us a card  
or call.



SOFTWARE SYSTEMS, INC.  
146 NORTH BROAD STREET  
GRIFFITH, INDIANA 46319  
(AC 219) 924-3522

## Model 6800CL4N CalClock/TIMER



## IT'S A HARDWARE CALENDAR/CLOCK

- Keeps date and time without servicing by the computer
- Day-of-week, month/day/year, hour:min:sec (12/24hr. + auto Leap Year)
- Hands off selling/control/access of ALL functions via software
- On-card battery and charging circuit keeps time for months, power off

## WITH AN INTERVAL TIMER INCLUDED

- For (TSC/Flex2/9 compatible) printer spooling, multi-tasking, etc.

Fully assembled & tested\* \$99.95 5" Disk (Flex2/9 Flex9/10) \$10.00  
Complete kit\* \$69.95 Gold-plated bus connectors \$ 8.00  
Bare board\* \$ 35.00 Shipping & handling \$ 3.00

\* FULLY DOCUMENTED: instructions; diagrams; theory; more than 20 pages  
of sample software (automatically puts date in Flex2/9 date buffer, adds  
time-of-day to assembly listings, maintains constant, current time+date  
display on top line of CRT). Batteries not included. All IC's socketed.

© FLEX is the registered trademark of Technical Systems Consultants, Inc.



COMPUWARE Corporation  
P.O. Box 2710  
Cherry Hill, NJ 08003  
609-428-2309 ✓197

Dealer & Volume Discounts  
New Jersey buyers: ADD 5%  
Terms: CASH, MC, or Visa  
Flex9/10 Flex2/9 (default) ✓

## APPLE

### \* \* Software Buyer's Guide \* \*

Save money and avoid disappointment by reading  
the reviews in 4 STAR SOFTWARE  
REVIEW ..... before you buy your programs.  
Compare games using our ★ rating system  
and shop wisely. Published quarterly.

### 4 STAR SOFTWARE REVIEW ✓206

Dept. K, 844 Windbreak Street  
Kamloops, BC, Canada V2B 5P1  
• Good service to our USA friends!

★ YES! Sign me up as a charter subscriber  
at us\$ 7.95 for 1 year.

★ Not sure. Send me a sample copy for  
\$1.99 plus \$1.00 for handling.

★ Check enclosed.

★ Charge my VISA, MC account

no. \_\_\_\_\_ exp. \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

Zip \_\_\_\_\_

## No. 3 UNBELIEVABLE OPPORTUNITY!

If You've Written an  
Extraordinary Program--  
We'd Like to Publish It!

### Programs needed for MANAGE- MENT applications:

**PERT & CPM SCHEDULING  
PREDICTIVE MODELING  
DECISION-MAKING SIMULATIONS  
PRODUCTION SCHEDULING  
EXPENSE ANALYSES**

Royalty checks may be in YOUR  
future. Write for our free Pro-  
grammer's Kit today.

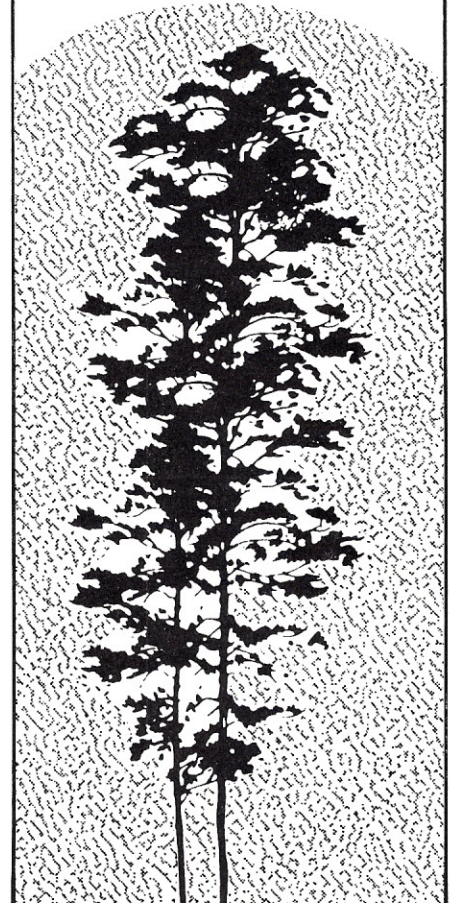
INSTANT SOFTWARE, INC. ✓75

Submissions Dept.  
Peterborough, NH 03458

## write or you're wrong!

Wayne Green Inc. and  
Desktop Computing invite  
you to share your comput-  
er experiences with us. If  
you have experience with  
a successful business ap-  
plication or installation-or  
if you know someone who  
does-we would like to  
hear about it. Drop us a  
line-or, better still, a manu-  
script-detailing the ins  
and outs of your applica-  
tion. And do it soon. We  
don't want you to miss out  
on this opportunity. For  
more information, write to:

Dave Smith, Managing Editor  
Desktop Computing  
80 Pine St.  
Peterborough, NH 03458





Listing 2 continued.

```

132      0088"  0090      CPMBP:  DEFW 0
133
134      END

Symbols:
BASE      0000  BDOS      0005  BOOTP    0001  CBIOS    0099'
CPMBP     0088"  DISKP    0082"  DRIVNO   0004  DUMCOM   0000"
FINISH    0075'  HOMEP    0080"  LDDMA    001A  LOAD     004F'
NSECTS    0011  READP    0086"  SCRAM    0000I'  SECP     0084"
SETUP     0011'  TBUF     0080

BASE      21#    25      26      27      28
BDOS      27#    64      80      113
BOOTP     25#    51
CBIOS     70      72      84      86      117#
CPMBP     67      73      99      116    132#
DISKP     58      69      126#
DRIVNO    26#    114
DUMCOM    39      47      102    121#
FINISH    91      98#
HOMEP     55      71      125#
LDDMA     32#    79      112
LOAD      76#    97
NSECTS    34#    74
READP     63      85      128#
SCRAM     36#
SECP      61      83      127#
SETUP     49#    88
TBUF      28#    50      111

```

passes Digital Research's portion of the operating system, BDOS, to call directly on the facilities of the hardware-dependent Customized Basic I/O System (CBIOS).

BDOS communicates with the specific hardware making up your system by using a series of jump commands located in the CBIOS jump table. The Digital Research manual, *CP/M System Alteration Guide*, gives the relative location of each entry in the table and the action CBIOS must take for each call. The absolute address of one of the entries, WBOOT, is stored in zero-page locations 0001 and 0002.

SCRAM uses this information to build a set of pointers to the CBIOS functions it needs. It calculates the starting address of CCP by subtracting 0806H from the BDOS entry-point address. SCRAM then overlays BASIC's stack and upper string space by reloading CCP from the A disk, moves the string variable that is to become the command line into the CCP command buffer, and finishes by passing control to the CCP entry point. CP/M then takes over, fooled into thinking

Listing 3. LINK utility.

```

00100 : *****
00110 : *** LINK ***
00120 : *****
00130 :

```

More

# EXTRAORDINARY INTRODUCTORY OFFER

## FOR NEW SUBSCRIBERS

Alphabetical Index

Contents

Key Word Finder

Bulletin Boards

User Groups & Associations

1981

1- Introduction
2- How to use & participate
3- White Pages (who's who)
4- Letters
5- White Pages (where's what)

White Pages

Yellow Pages

**FOR JUST \$10.00 YOU GET**

- 1) a Free copy of current issue
- 2) a One Year Subscription!
- 3) a Free 25 word White Page Listing!
- 4) \$5.00 Credit on a Yellow Page Listing!
- 5) \$10.00 Credit towards any size Display Ad!

**Total Value = \$28.50**

the Computerist's Directory

349 PO BOX 405  
FORESTVILLE, CA 95436  
(707) 887-1857

Let your fingers do the talking

☐ VISA ☐ MASTER CHARGE ☐ AMERICAN EXP

ACCOUNT NO. \_\_\_\_\_

NAME \_\_\_\_\_ ADDRESS \_\_\_\_\_ CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_

SIGNATURE \_\_\_\_\_

EXPIRES \_\_\_\_\_

Send me ☐ Display ad rates ☐ store order form

ENCLOSED \$ \_\_\_\_\_

**What is the Computerist's Directory?**  
It is a national "paper data base" in phone book format dedicated to all computer users including professionals, business people, hobbyists and prospective buyers. It is published twice annually in January and July with quarterly updates planned for April '82.



it has just received a warm boot from a disk with an auto-load message.

Strictly speaking, SCRAM is not a subroutine; it doesn't have a return to the calling program. However, BASIC doesn't know this, so SCRAM is called with the usual subroutine CALL.

Since it makes use of CP/M's internal structure, SCRAM probably cannot be used, unmodified, with any other operating system—not even those claimed to be "compatible" with CP/M. Although it is written to be independent of the memory size of your system and the initial address of your CCP, it does make use of known locations in the zero page. If your version of CP/M has a zero-page offset, change the value of BASE in line 21.

### The Utilities

Utility programs are supposed to make life easier for the programmer. That is why I wrote the two shown here.

Debugging can be one of the most frustrating activities known to mankind. Late one night, after the third recompilation and relink in 15 minutes, I began to make operator errors

### Listing 3 continued.

```

00140 '      Written by M. L. Lesser, January 17, 1981
00150 '      Written in Microsoft BASIC-80 version 5.2
00160 '      Compiled with BASCOM 5.2, switch /Z
00170 '
00180 '      This program link-loads <filename.REL> produced by
00190 '      the BASCOM BASIC-80 compiler with any called assembly-
00200 '      language subroutines from MYLIB.REL. Input command
00210 '      is "LINK <dev:filename>" typed on the console.
00220 '      Output is <filename.COM>, and is stored on the drive
00230 '      denoted by "dev:" on the calling command line.
00240 '      To "Load and Go", use <dev:filename/G> on input;
00250 '      Output <filename.COM> will still be written to disk.
00260 '
00270 '      To use, LINK.COM, L80.COM, MYLIB.REL and BASLIB.REL
00280 '      must be on the logged-on drive. <filename.REL> can
00290 '      be on either drive.
00300 '
00310 '
00400 '      The following are string variables:
00410 '
00420 '      FILENAME      Input <dev:filename>
00430 '      COMMAND       L80 calling sequence
00440 '
00450 '
00500 '      Setup
00510 '
00520 DEFINT I
00530 DEFSTR C,F
00540 '
00550 '
01000 '      Main Program
01010 '
01020 CALL PICKUP(FILENAME)           'Read rest of comand line
01030 IF LEN(FILENAME) = 0 THEN LINE INPUT "<FILENAME>? ";FILENAME
01040 '      ELSE PRINT "Link-loading " FILENAME
01050 LET I = INSTR(FILENAME,"/")      'Check for /G switch
01060 LET COMMAND = "L80 " + FILENAME
01070 IF I = 0 THEN LET COMMAND = COMMAND + "/E,MYLIB/S,"
01080 '      ELSE LET COMMAND = COMMAND + ",MYLIB/S,"
01090 IF I <> 0 THEN LET FILENAME = LEFT$(FILENAME,I-1)
01100 LET COMMAND = COMMAND + FILENAME + "/"
01110 CALL SCRAM(COMMAND)             'Link <filename>

```

## GIMIX & MICROWARE present the 6809 PROFESSIONAL TOOLBOX

A GIMIX 56KB static RAM 2Mhz 6809 Dual Drive Mainframe System with MICROWARE's Multiuser OS9 Pro-Package --special combination price **\$3968.09**. This system includes the GIMIX Mainframe with 30 amp C.V. ferro-resonant power supply, SS50/50C Motherboard, 2Mhz 6809 CPU with time of day clock and battery back-up, 6840 programmable timer, 2 serial ports, 56K Bytes of Static RAM, and two 5 1/4" disk drives and double density controller installed in the GIMIX Mainframe with the same brownout protection and power supply reliability that GIMIX is famous for.

MICROWARE's OS9 Pro-Package includes OS9 Level 1, the BASIC09 interactive compiler, Macro Text Editor, Interactive Assembler, and Interactive Debugger which gives you the necessary tools for efficient structured software development.

All GIMIX Boards have gold plated bus connectors, and are burned in and 100% tested before shipping. And this system is expandable. You can add memory, I/Os, video or graphics cards, Arithmetic processors, additional drive capacity, and other hardware now or in the future to this SS50 bus structured system from GIMIX or other SS50 bus compatible manufacturers. MICROWARE has other OS9 software such as the Stylograph Screen-Oriented Word Processor available now, and in the future will be announcing other languages and utilities that run under OS9. And coming soon from MICROWARE will be OS9 Level 2 that lets you address up to 1 megabyte of memory.

GIMIX & GHOST are trademarks of GIMIX Inc., Basic 09, OS9 and Microware are trademarks of Motorola and Microware Inc.

For further info on the best in 6809 Hardware, contact:



**GIMIX inc.** ✓22  
The Company that delivers  
Quality Electronic products since 1975.

**1337 WEST 37th PLACE, CHICAGO, IL 60609**  
(312) 927-5510 • TWX 910-221-4055

For further info on the best in 6809 Software, contact:



**MICROWARE**  
Microware Systems Corp.  
5835 Grand Avenue, Des Moines, Iowa 50304  
(515) 279-8844 • TWIX 910-520-2535

See us at NCC booth 971-2

MODEL II



**\*602<sup>00</sup> DISCOUNT**  
**Off List**  
**64K 1 DRIVE \*3297.00**

No Taxes on Out of State Shipments  
Immediate Shipment On Most Items

## TRS-80® DISCOUNT

### BUY DIRECT

We carry the full line of TRS-80 Computers. All other software, furniture, and accessories at discount from catalog price. We stock most items to assure you fast delivery and save you money.

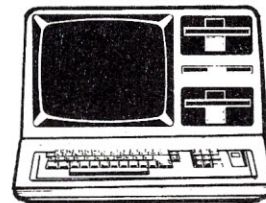
**WRITE FOR A FREE CATALOG**

**1-800-841-0860 Toll Free Order Entry**  
**MICRO MANAGEMENT SYSTEMS, INC.** ✓100

DEPT. NO. 7

DOWNTOWN PLAZA SHOPPING CENTER  
115 C SECOND AVE. S.W.  
CAIRO, GEORGIA 31728  
GA. & EXPORT PHONE NO. (912) 377-7120

MODEL III



**26-1061 4K I.....\$609.00**  
**26-1062 16K III.....849.00**  
**26-1066 48K III**  
**2 Drives, RS232.....2077.00**

Largest Inventory in S.E. U.S.A.



in typing the redundant command line that calls LINK-80. So I wrote LINK (Listing 3) to relieve this added source of frustration.

LINK generates the normal LINK-80 command line, either for "load and save" or "load, save and go," depending on whether you use the switch "/G" after the name of the file that is to be linked. To use LINK, you must put all your private subroutines—including PICKUP and SCRAM—in your private library (MYLIB.REL) by using LIB-80. Then, LINK will make sure that any subroutine called in the program being linked is inserted in its proper place.

EDIT (Listing 4) is a cure for the near-fatal bug in Microsoft's EDIT-80, release 2.0. While you are editing your text file, EDIT-80 is building an index file so it can write your final version back to disk when you exit from the editor. Unfortunately, if the text file is very long and the changes extensive, release 2.0 leaves the now-obsolete index behind. While the newly-edited file is correct as written to disk and the compiler or assembler can use it, EDIT-80 can't re-edit it until you

have gotten rid of the old index file.

EDIT looks for an index file and kills it if it exists, before using SCRAM to call in EDIT-80 and the file to be edited.

Now, in spite of all the foregoing, you don't *have* to use a compiled BASIC to use assembly-language subroutines. Most BASICs have a USR command. And the interpreter version of BASIC-80 release 5.x allows the use of the same CALL command as does BASCOM. However, there is a major difference in what you can't do with an interpreter.

You can't use subroutines that look for data keyed in with the program call, because that call was made after you were already in BASIC. So you can't use PICKUP with an interpreter BASIC.

You can use SCRAM, but I'm not sure it is worth the effort. With the interpreter, you have to know exactly where to put the subroutine in absolute address space. You can't let the

system take care of the messy details for you.

Each interpreted program that uses assembly-language subroutines must contain the absolute addresses in RAM where it will find each subroutine it uses, along with a command to protect the subroutine space from BASIC's storage manager. When you want to run one of these programs, you have to load the necessary subroutines into their proper places *before* you call the BASIC interpreter. The bookkeeping, alone, is more bother than it is worth!

Compare this with using LINK to build the subroutines into the compiled object program. Once linked, any subroutine called from your library is a permanent part of the program that called it, and will load with no further effort on your part.

The ease of making your own extensions to the language is another good reason to use a compiled form of BASIC for your serious applications. ■



**APPLE II®**

\*\*\*\*\*

HOUSEHOLD AIDS

\*\*\*\*\*

1. HOUSEHOLD INVENTORY
2. VITAL PAPERS
3. PERSONAL STATEMENT
4. RESUME
5. VIDEO TAPE FILE
6. NAME/ADDRESS/PHONE
7. END

SELECT ONE? **\$49.95**  
32K, Disk 3.2 or 3.3  
Plus or Plus Card

**1981 INCOME TAX \$125.00**  
48K, Disk 3.2 or 3.3  
Plus or Plus Card

Send \$2 for more information to be applied to first order. Also programs for IBM Personal Computer.

VISA & MASTERCARD  
**N.F. SYSTEMS** ✓ 186  
P.O. Box 76363  
Atlanta, Georgia 30358



```

00100 ' *****
00200 ' *** EDIT-80 CLEAN UP ***
00300 ' *****
00400 '
00500 '
00600 ' Written in BASIC-80 BASCOM 5.2, switches /Z/X
00700 ' Written by M. L. Lesser, 1-25-81
00800 ' Object program filed as EDIT.COM
00900 '
01000 '
01100 ' This program corrects for the bug in EDIT-80 release 2.0
01200 ' by erasing the corresponding .$.xx index file before starting
01300 ' a new editing session.
01400 '
01500 ' Input command is: EDIT <FILENAME>. Output is written
01600 ' to the same drive as <FILENAME>.
01700 '
01800 ' NOTE: Both EDIT.COM and EDIT80.COM must be on the logged-on
01900 ' drive. <FILENAME> must specify the disk as part of
02000 ' the command line, if not on the logged-on drive.
02100 '
02200 DEFINT I,J
02300 DEFSTR C,F
02400 ON ERROR GOTO 10000
02500 '
02600 CALL PICKUP(FILENAME) 'Read rest of command line
02700 IF LEN(FILENAME) = 0 THEN GOTO 3300 'If no <filename> call SCRAM
02800 LET I = INSTR(FILENAME,".") 'Check for filetype
02900 LET J = INSTR(FILENAME,"/") 'Check for switch
03000 IF I = 0 THEN GOSUB 5000 'Insert ".MAC" if no filetype
03100 IF J = 0 OR J - I > 2 THEN LET FILEINDEX = LEFT$(FILENAME,I) +
    "$" + MID$(FILENAME,I+1,2) ELSE GOSUB 7000
    'Short filetype with switch
    'Error if no index file

03200 KILL FILEINDEX
03300 LET COMMAND = "EDIT80 " + FILENAME
03400 CALL SCRAM(COMMAND) 'Edit <filename>
03500 '
05000 ' Subroutine: Insert default filetype ".MAC"
05100 IF J = 0 THEN LET FILENAME = FILENAME + ".MAC"
05200 IF J <> 0 THEN LET FILENAME = LEFT$(FILENAME,J-1) + ".MAC" +
    MID$(FILENAME,J)
05300 LET I = INSTR(FILENAME,".")
05400 LET J = INSTR(FILENAME,"/")
05500 RETURN
05600 '
07000 ' Subroutine: For short filetype when switch exists
07100 LET ITEM = J - I - 1
07200 LET FILEINDEX = LEFT$(FILENAME,I) + "$" + MID$(FILENAME,I+1,ITEM)
07300 RETURN
07400 '
10000 ' Error trap
10100 IF ERR = 53 AND ERL = 3200 THEN RESUME NEXT
10200 ON ERROR GOTO 0
10300 '

```

Listing 4. EDIT-80 utility.



# VECTOR GRAPHIC USERS

**SAVE TIME!!!** on every backup and format operation.

With our new **TURBOCHARGED™ BACKUP**, copy and verify your System B diskettes in only 60 seconds instead of 3 min 20 sec. Or your 2600 diskettes in 3 min 40 sec instead of 6 min 20 sec.

Available for system B's and 2600's

## \$45

Ask for our catalog of software products for Vector Graphic computers.

**Modern Software Design** ✓364  
18590 Ventura Blvd, Suite 202  
Tarzana, CA 91356  
(213) 343-2083

## 6809 Small C Compiler

- Generates assembly language source output
- Requires only 16K memory
- Library functions in source code
- Generates position independent code
- Supports most C functions
- Generates ROMmable code

INTRODUCTORY PRICE \$75  
specify 5 or 8 inch diskette SSB or FLEX

TERMS: Check or Money Order, California residents add 6%. C.O.D. orders add \$3.50 shipping & handling.

**DUGGER'S GROWING SYSTEMS** ✓174  
POST OFFICE BOX 305 SOLANA BEACH, CA 92075

Available soon: Basic to C Converter

## Free



## Microprocessor Catalog

40 page catalog of 6800 single board computers, interface modules, SPRINT 66 control computer/development system, WIZRD multitasking DOS, assemblers, compilers, BASIC, cross assemblers, cross compilers, custom engineering, OEM applications software.

**WINTK**

Wintek Corp.  
1801 South Street  
Lafayette, IN 47904  
317-742-8428 ✓163

IF YOU'VE GOT  
**OSI** We've got great products for you!

**OS-65DV3.2 DISASSEMBLY MANUAL** 60 page manual, complete with cross reference listing. Fully commented. \$25.95.

**REF COMMAND UNDER BASIC** Lists line numbers, variables, constants for 65D or 65U. \$31.95.

**SPOOLER-DESPOOLER UTILITY** Super fast. Frees up screen, feeds data to serial or parallel printers. \$69.95.

**FIG FORTH UNDER OS-65U** Runs under multi-user, hard disk systems with all the extras. \$89.95.

**VIDEO ROUTINE** Convenient control of variable screen parameters. May be connected to graphics resolution booster. \$25.95 or \$29.95.

**GRAPHICS RESOLUTION BOOSTER** Hardware to boost screen resolution by 8 times to 128 x 128. \$49.95. With video routine and software extensions \$79.95.

Write or call for free product catalog and get all the details.

✓213

**SOFTWARE  
CONSULTANTS**

6435 Summer Ave.  
Memphis, TN 38134  
901/377-3503

TIRED OF CHANGING  
CABLES AND TURNING  
KNOBS?



\$175

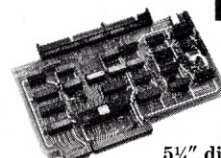
## ASCII SWITCH

- Computer Controlled or Manual
- Command Code User Selectable
- Select one of two Peripherals
- Select one of two Computers
- Asynchronous to 19200 Baud
- No External Power Needed

Call or write

**ADVANCED SYSTEMS CONCEPTS, INC.**  
P.O. BOX Q, ALTADENA, CA. 91001  
(213) 684-5461 or 794-2308 ✓39

**ZENITH/Heath  
Users**



Double Your  
5 1/4" disk storage  
capacity without adding a drive.

Get twice as much from your H88 or H89 microcomputer. Our FDC-880H floppy disk controller, in conjunction with your 5 1/4" drives, for example, expands memory capacity from 256 bytes to 512 bytes per sector.

And it handles single and double-sided, single and double-density, 8" and 5 1/4" drives — simultaneously.

Call 714/275-1272 today or write for details.



C.D.R. Systems Inc.

Controlled Data Recording Systems, Inc.  
7667 Vickers St., San Diego, CA 92111

✓148

## Subscription Problem?

Kilobaud Microcomputing does not keep subscription records on the premises, therefore calling us only adds time and doesn't solve the problem.

Please send a description of the problem and your most recent address label to:

**Kilobaud Microcomputing**  
Subscription Dept.  
PO Box 997  
Farmingdale, NY 11737

Thank you and enjoy your subscription.

**No. 4  
UNBELIEVABLE  
OPPORTUNITY!**

You've Written  
a Fantastic Game?

Then We'd Like to Publish It!

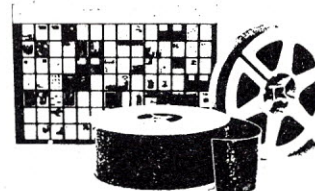
We're looking for hot GAME programs:

ARCADE (HI-SPEED GRAPHICS)  
ADVENTURE FORMAT  
FANTASY WARGAMING  
BOARD GAMES  
LOGIC & PUZZLE GAMES

There's Gold in them there Games! Write for our free Programmer's Kit today.

**INSTANT SOFTWARE, INC.** ✓75  
Submissions Dept.  
Peterborough, NH 03458

this publication  
is available in  
microform



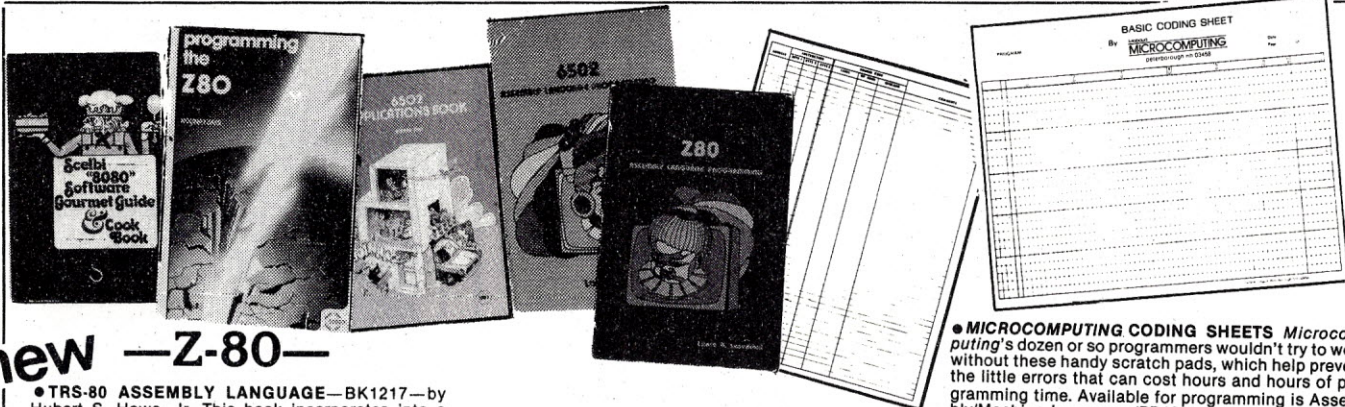
University Microfilms International

300 North Zeeb Road  
Dept. P.R.  
Ann Arbor, MI 48106  
U.S.A.

18 Bedford Row  
Dept. P.R.  
London, WC1R 4EJ  
England



# kb microcomputing book nook



## new —Z-80—

● **TRS-80 ASSEMBLY LANGUAGE**—BK1217—by Hubert S. Howe, Jr. This book incorporates into a single volume all the pertinent facts and information you need to know to program and enjoy the TRS-80. Included are clear presentations of all introductory concepts, completely tested practical programs and sub-routines, details of ROM and RAM and disk operating systems, plus comprehensive tables, charts and appendices. Suitable for the first time user or more experienced users. \$9.95.\*

● **INSIDE LEVEL II**—BK1183—For machine language programmers! This is a comprehensive reference guide to the Level II ROMs, allowing easy utilization of the sophisticated routines they contain. It concisely explains set-ups, calling sequences, variable passage and I/O routines. Part II presents an entirely new composite program structure which unloads under the SYSTEM command and executes in both BASIC and machine code with the speed and efficiency of a compiler. Special consideration is given to disk systems. \$15.95.\*

● **PROGRAMMING THE Z-80**—BK1122—by Rodney Zaks. Here is assembly language programming for the Z-80 presented as a progressive, step-by-step course. This book is both an educational text and a self-contained reference book, useful to both the beginning and the experienced programmer who wish to learn about the Z-80. Exercises to test the reader are included. \$14.95.\*

● **Z-80 SOFTWARE GOURMET GUIDE AND COOK-BOOK**—BK1045—by Nat Wadsworth. Scelbi's newest cookbook! This book contains a complete description of the powerful Z-80 instruction set and a wide variety of programming information. Use the author's ingredients including routines, subroutines and short programs, choose a time-tested recipe and start cooking! \$16.99.\*

● **Z-80 ASSEMBLY LANGUAGE PROGRAMMING**—BK1177—by Lance A. Leventhal. This book thoroughly covers the Z-80 instruction set, abounding in simple programming examples which illustrate software development concepts and actual assembly language usage. Features include Z-80 I/O devices and interfacing methods, assembler conventions, and comparisons with 8080A/8085 instruction sets and interrupt structure. \$16.99.\*

● **VOL. I COMPONENT TESTERS**—LB7359—... how to build transistor testers (8), diode testers (3), IC testers (3), voltmeters and VTVMs (9), ohmmeters (8 different kinds), inductance (3), capacity (9), Q measurement, crystal checking (6), temperature (2), aural meters for the blind (3) and all sorts of miscellaneous data on meters... using them, making them more versatile, making standards. Invaluable book. \$4.95.\*

● **VOL. II AUDIO FREQUENCY TESTERS**—LB7360—... jam packed with all kinds of audio frequency test equipment. If you're into SSB, RTTY, SSTV, etc., this book is a must for you... a good book for hi-fi addicts and experimenters, too! \$4.95.\*

● **VOL. III RADIO FREQUENCY TESTERS**—LB7361—Radio frequency waves, the common denominator of Amateur Radio. Such items as SWR, antenna impedance, line impedance, rf output and field strength; detailed instructions on testing these items includes sections on signal generators, crystal calibrators, grid dip oscillators, noise generators, dummy loads and much more. \$4.95.\*

● **VOL. IV IC TEST EQUIPMENT**—LB7362—Become a troubleshooting wizard! In this fourth volume of the 73 TEST EQUIPMENT LIBRARY are 42 home construction projects for building test equipment to work with your ham station and in servicing digital equipment. Plus a cumulative index for all four volumes for the 73 TEST EQUIPMENT LIBRARY. \$4.95.\*

\*Use the order card in this magazine or itemize your order on a separate piece of paper and mail to Kilobaud Microcomputing Book Department • Peterborough NH 03458. Be sure to include check or detailed credit card information.

## PROGRAMMING

The Microprocessor Software Engineering Series by John Zarrella provides common sense descriptions of advanced computer system topics for engineers, programmers and development managers. Each volume is a self-contained review of a software engineering topic, explaining fundamental concepts in easy-to-understand language and describing sophisticated software tools and techniques. Detailed glossary of technical jargon is included in each volume. This series will help you find the solutions to your software problems.

● **OPERATING SYSTEMS: CONCEPTS AND PRINCIPLES**—BK1193—Presents an overview of the basic operating system types, their components and capabilities. \$7.95.\*

● **WORD PROCESSING AND TEXT EDITING**—BK1194—Provides a firm basis for understanding word processing terminology and for comparing systems. \$7.95.\*

● **SYSTEM ARCHITECTURE**—BK1195—Presents a detailed overview of advanced computer system design including object architecture and capability-based addressing. \$9.95.\*

## —6502—

\* ● **THE APPLE II USER'S GUIDE**—BK1220—by Lon Poole, Martin McNiff, and Steven Cook. This guide is the key to unlocking the full power of your Apple II or Apple II Plus. Topics include: "Applesoft and Integer BASIC Programming"—especially how to make the best use of Apple's color, color and graphics capabilities. "Machine Level Programming." "Hardware Features"—which covers the disk drive and printer, and "Advanced Programming"—describing high resolution graphics techniques and other advanced applications. Well organized and easy to use. \$15.00.\*

● **PROGRAMMING THE 6502 (Third Edition)**—BK1005—Rodney Zaks has designed a self-contained text to learn programming, using the 6502. It can be used by a person who has never programmed before, and should be of value to anyone using the 6502. The many exercises will allow you to test yourself and practice the concepts presented. \$12.95.\*

● **6502 APPLICATIONS BOOK**—BK1006—Rodney Zaks presents practical-application techniques for the 6502 microprocessor, assuming an elementary knowledge of microprocessor programming. You will build and design your own domestic-use systems and peripherals. Self-test exercises included. \$12.95.\*

● **6502 ASSEMBLY LANGUAGE PROGRAMMING**—BK1176—by Lance A. Leventhal. This book provides comprehensive coverage of the 6502 microprocessor assembly language. Leventhal covers over 80 programming examples from simple memory load loops to complete design projects. Features include 6502 assembler conventions, input/output devices and interfacing methods, and programming the 6502 interrupt system. \$16.99.\*

● **6502 SOFTWARE GOURMET GUIDE AND COOK-BOOK**—BK1055—by Robert Findley. This book introduces the BASIC language programmer into the realm of machine-language programming. The description of the 6502 structure and instruction set, various routines, subroutines and programs are the ingredients in this cookbook. "Recipes" are included to help you put together exactly the programs to suit your taste. \$12.95.\*

● **MICROCOMPUTING CODING SHEETS** Microcomputing's dozen or so programmers wouldn't try to work without these handy scratch pads, which help prevent the little errors that can cost hours and hours of programming time. Available for programming in Assembly/Machine Language (PD1001), which has columns for address, instruction (3 bytes), source code (label op code, operand) and comments; and for BASIC (PD1002) which is 72 columns wide. 50 sheets to a pad. \$2.39.\*

## 68000/6809/8080

\* ● **6809 MICROCOMPUTER PROGRAMMING AND INTERFACING**—BK1215—by Andrew C. Staugaard, Jr. Getting involved with Tandy's new Color Computer? If so, this new book from the Blacksburg Group will allow you to exploit the awesome power of the machine's 6809 microprocessor. Detailed information on processor architecture, addressing modes, register operation, data movement, arithmetic logic operations, I/O and interfacing is provided, as well as a review section at the end of each chapter. Four appendices are included covering the 6809 instruction set, specification sheets of the 6809 family of processors, other 6800 series equipment and the 6809/6821 Peripheral Interface Adapter. This book is a must for the serious Color Computer owner. \$13.95.\*

\* ● **68000 MICROPROCESSOR HANDBOOK**—BK1216—by Gerry Kane. Whether you're currently using the 68000, planning to use it, or simply curious about one of the newest and most powerful microprocessors, this handbook has all the answers. A clear presentation of signal conversions, timing diagram conventions, functional logic, three different instruction set tables, exception processing, and family support devices provides more information about the 68000 than the manufacturer's data sheets. A stand alone reference book which can also be used as a supplement to *An Introduction to Microcomputers: Vol. 2—Some Real Microprocessors*. \$6.99.\*

● **8080A/8085 ASSEMBLY LANGUAGE PROGRAMMING**—by Lance Leventhal—BK1004—Assembly language programming for the 8080A/8085 is explained with a description of the functions of assemblers and assembly instructions, and a discussion of basic software development concepts. Many fully debugged, practical programs are included as is a special section on structured programming. \$15.99.\*

● **8080 SOFTWARE GOURMET GUIDE AND COOK-BOOK**—BK1102—If you have been spending too much time developing simple routines for your 8080, try this new book by Scelbi Computing and Robert Findley. Describes sorting, searching, and many other routines for the 8080 user. \$12.95.\*

## —COOKBOOKS—

● **CMOS COOKBOOK**—BK1011—by Don Lancaster. Details the application of CMOS, the low power logic family suitable for most applications presently dominated by TTL. Required reading for every serious digital experimenter! \$10.50.\*

● **TVT COOKBOOK**—BK1064—by Don Lancaster. Describes the use of a standard television receiver as a microprocessor CRT terminal. Explains and describes character generation, cursor control and interface information in typical, easy-to-understand Lancaster style. \$9.95.\*

● **TTL COOKBOOK**—BK1063—by Don Lancaster. Explains what TTL is, how it works, and how to use it. Discusses practical applications, such as a digital counter and display system, events counter, electronic stopwatch, digital voltmeter and a digital tachometer. \$9.50.\*

No C.O.D. orders accepted. All orders add \$1.50 for first book, \$1.00 each additional book, \$10.00 per book foreign airmail. Please allow 4-6 weeks for delivery. Questions regarding your order? Please write to customer Service at the following address.

**\* new**

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

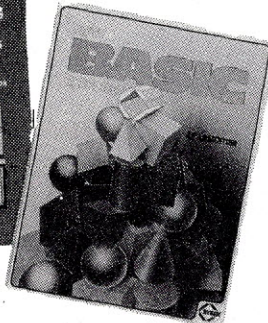
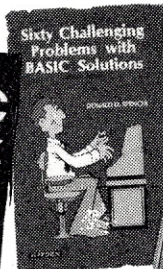
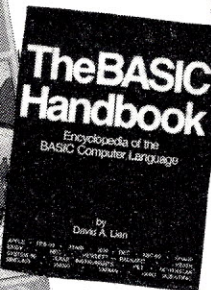
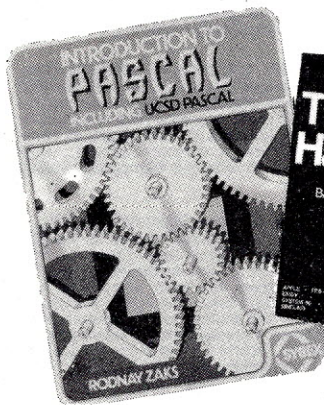
**FOR TOLL FREE ORDERING CALL 1-800-258-5473**



# kb microcomputing book nook

## —BASIC & PASCAL—

## new —BUSINESS—



new

● **INTRODUCTION TO TRS-80 LEVEL II BASIC AND COMPUTER PROGRAMMING**—BK1219—by Michael P. Zabinski. Written by an experienced educator, this is the book for those beginners who want to learn about computers without having to become an expert. It has practical programs, useful line-by-line comments, excellent flowcharts accompanied by line numbers and over 200 exercises which help the reader assess progress, reinforce comprehension, and provide valuable practical experience. \$10.95.\*

● **50 BASIC EXERCISES**—BK1192—by J. P. Lamoitier. This book is structured around the idea that the best way to learn a language is through actual practice. It contains 50 completely explained exercises: statement and analysis of the problem, flowcharts, programs and actual runs. Program subjects include mathematics, business, games, and operations research, and are presented in varying levels of difficulty. This format enables anyone to learn BASIC rapidly, checking their progress at each step. \$12.95\*

● **THE BASIC HANDBOOK**—BK1174—SECOND EDITION—by David Lien. This book is unique. It is a virtual ENCYCLOPEDIA of BASIC. While not favoring one computer over another, it explains over 250 BASIC words, how to use them and alternate strategies. If a computer does not possess the capabilities of a needed or specified word, there are often ways to accomplish the same function by using another word or combination of words. That's where the HANDBOOK comes in. It helps you get the most from your computer, be it a "bottom-of-the-line" micro or an oversized monster. \$19.95.\*

● **LEARNING LEVEL II**—BK1175—by David Lien. Written especially for the TRS-80, this book concentrates on Level II BASIC, exploring every important BASIC language capability. Updates are included for those who have studied the Level I User's Manual. Sections include: how to use the Editor, dual cassette operation, printers and peripheral devices, and the conversion of Level I programs to Level II. \$15.95.\*

● **BASIC BASIC (2ND EDITION)**—BK1026—by James S. Coan. This is a textbook which incorporates the learning of computer programming using the BASIC language with the teaching of mathematics. Over 100 sample programs illustrate the techniques of the BASIC language and every section is followed by practical problems. This second edition covers character string handling and the use of data files. \$10.50.\*

● **ADVANCED BASIC**—BK1000—Applications, including strings and files, coordinate geometry, area, sequences and series, simulation, graphing and games. \$10.75.\*

● **SIXTY CHALLENGING PROBLEMS WITH BASIC SOLUTIONS (2nd Edition)**—BK1073—by Donald Spencer, provides the serious student of BASIC programming with interesting problems and solutions. No knowledge of math above algebra required. Includes a number of game programs, as well as programs for financial interest, conversions and numeric manipulations. \$6.95.\*

● **PASCAL**—BK1188—by Paul M. Chirlian. Professor Chirlian's textbook combines a simple approach to the PASCAL language with comprehensive coverage on how a computer works, how to use a flowchart, working from a terminal as well as batch operation and debugging. Special attention is paid to idiosyncrasies of the language and syntax flowcharts abound for the convenience of the experienced programmer. Well indexed. \$12.95\*

● **INTRODUCTION TO PASCAL**—BK1189—by Rodnay Zaks. A step-by-step introduction for anyone wanting to learn the language quickly and completely. Each concept is explained simply and in a logical order. All features of the language are presented in a clear, easy-to-understand format with exercises to test the reader at the end of each chapter. It describes both standard PASCAL and UCSD PASCAL, the most widely used dialect for small computers. No computer or programming experience is necessary. \$14.95.\*

● **PROGRAMMING IN PASCAL**—BK1140—by Peter Grogono. The computer programming language PASCAL was the first language to embody in a coherent way the concepts of structured programming, which has been defined by Edsger Dijkstra and C.A.R. Hoare. As such, it is a landmark in the development of programming languages. PASCAL was developed by Niklaus Wirth in Zurich; it is derived from the language ALGOL 60 but is more powerful and easier to use. PASCAL is now widely accepted as a useful language that can be efficiently implemented, and as an excellent teaching tool. It does not assume knowledge of any other programming language; it is therefore suitable for an introductory course. \$12.95.\*

## —GAMES—

● **40 COMPUTER GAMES**—BK7381—Forty games in all in nine different categories. Games for large and small systems, and even a section on calculator games. Many versions of BASIC used and a wide variety of systems represented. A must for the serious computer gamesman. \$7.95\*

● **BASIC COMPUTER GAMES**—BK1074—Okay, so once you get your computer and are running in BASIC, then what? Then you need some programs in BASIC, that's what. This book has 101 games for you from very simple to real buggers. You get the games, a description of the games, the listing to put in your computer and a sample run to show you how they work. Fun. Any one game will be worth more than the price of the book for the fun you and your family will have with it. \$7.50.\*

● **MORE BASIC COMPUTER GAMES**—BK1182—edited by David H. Ahl. More fun in BASIC! 84 new games from the people who brought you *BASIC Computer Games*. Includes such favorites as Minotaur (battle the mythical beast) and Eliza (unload your troubles on the doctor at bargain rates). Complete with game description, listing and sample run. \$7.50.\*

● **WHAT TO DO AFTER YOU HIT RETURN**—BK1071—PCC's first book of computer games... 48 different computer games you can play in BASIC... programs, descriptions, many illustrations. Lunar Landing, Hamurabi, King, Civel 2, Qubic 5, Taxman, Star Trek, Crash, Market, etc. \$10.95.\*

● **THEORY Z**—BK1226—How American Business Can Meet the Japanese Challenge—by William Ouchi. Why are the Japanese catching up and surpassing American industrial productivity? What allows Japanese industrialists to offer guaranteed lifetime employment to their workforce? This book will help you understand the Theory Z managerial philosophy and its implications for the American corporate future. Examples are given of the American industrial giants already operating under Z-style management, and the impact of this style on the quality of their executives and workers is explored. A must for the alert businessman, large or small. \$12.95.\*

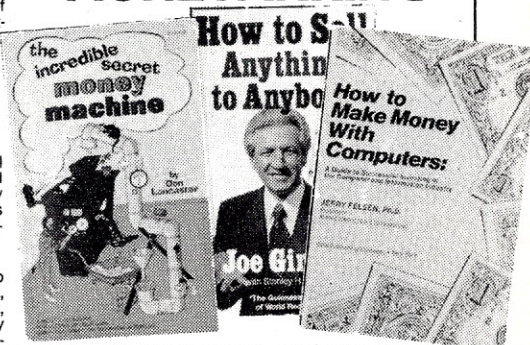
● **SO YOU ARE THINKING ABOUT A SMALL BUSINESS COMPUTER**—BK1222—by Richard G. Canning and Nancy C. Leeper. For a well-organized manual on the process of selecting the right computer system for your small business, this text can't be excelled. Designed to introduce the novice in data and word processing to the real benefits of computerization, the book is filled with money- and time-saving tips, photos of equipment, lists of suppliers, prices, explanations of computer terminology, and helpful references to additional sources of information. Everyone contemplating a first computer installation should have this book. \$14.00.\*

● **PAYROLL WITH COST ACCOUNTING—IN BASIC**—BK1001—by L. Poole & M. Borchers. Includes program listings with remarks, descriptions, discussions of the principle behind each program, file layouts, and a complete user's manual with step-by-step instructions, flowcharts, and simple reports and CRT displays. Payroll and cost accounting features include separate payrolls for up to 10 companies, time-tested interactive data entry, easy correction of data entry errors, job costing (labor of distribution), check printing with full deduction and pay detail, and 16 different printed reports, including W-2 and 941 (in CBASIC). \$20.00.\*

● **SOME COMMON BASIC PROGRAMS**—BK1053—published by Adam Osborne & Associates, Inc. Perfect for non-technical computerists requiring ready-to-use programs. Business programs, plus miscellaneous programs. Invaluable for the user who is not an experienced programmer. All will operate in the stand-alone mode. \$14.99 paperback.

● **PIMS: PERSONAL INFORMATION MANAGEMENT SYSTEM**—BK1009—Learn how to unleash the power of a personal computer for your own benefit in this ready-to-use data-base management program. \$11.95.\*

## —MONEYMAKING—



● **HOW TO MAKE MONEY WITH COMPUTERS**—BK1003—In 10 information-packed chapters, Jerry Felsen describes more than 30 computer-related, money-making, high profit, low capital investment opportunities. \$15.00.\*

● **HOW TO SELL ANYTHING TO ANYBODY**—BK7306—According to *The Guinness Book of World Records*, the author, Joe Girard, is "the world's greatest salesman." This book reveals how he made a fortune—and how you can, too. \$2.25.\*

● **THE INCREDIBLE SECRET MONEY MACHINE**—BK1178—by Don Lancaster. A different kind of "cookbook" from Don Lancaster. Want to slash taxes? Get free vacations? Win at investments? Make money from something that you like to do? You'll find this book essential to give you the key insider details of what is really involved in starting up your own money machine. \$5.95.\*

\*Use the order card in this magazine or itemize your order on a separate piece of paper and mail to Kilobaud Microcomputing Book Department • Peterborough NH 03458. Be sure to include check or detailed credit card information.

No C.O.D. orders accepted: All orders add \$1.50 for first book, \$1.00 each additional book, \$10.00 per book foreign airmail. Please allow 4-6 weeks for delivery. Questions regarding your order? Please write to customer Service at the following address.

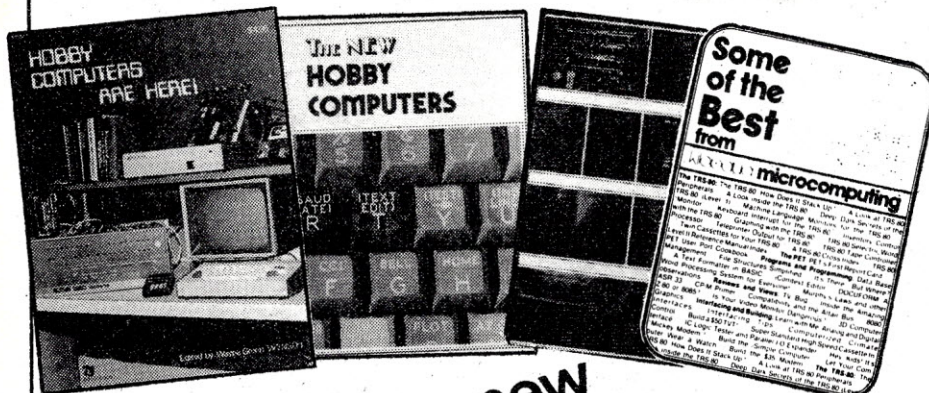
PRICES SUBJECT TO CHANGE WITHOUT NOTICE

**FOR TOLL FREE ORDERING CALL 1-800-258-5473**



# kb microcomputing book nook

## —INTRODUCTORY—



● **HOBBY COMPUTERS ARE HERE!**—BK7322—If you want to come up to speed on how computers work... hardware and software... this is an excellent book. It starts with fundamentals and explains the circuits, and the basics of programming, along with a couple of TVT construction projects, ASCII-Baudot, etc. This book has the highest recommendations as a teaching aid. \$4.95.\*

● **THE NEW HOBBY COMPUTERS**—BK7340—This book takes it from where "HOBBY COMPUTERS ARE HERE!" leaves off, with chapters on Large Scale Integration, how to choose a microprocessor chip, an introduction to programming, low cost I/O for a computer, computer arithmetic, checking memory boards... and much, much more! Don't miss this tremendous value! Only \$4.95.\*

new

● **AN INTRODUCTION TO MICROCOMPUTERS, VOL. 0**—BK1130—The Beginner's Book—Written for readers who know nothing about computers—for those who have an interest in how to use computers—and for everyone else who must live with computers and should know a little about them. The first in a series of 4 volumes, this book will explain how computers work and what they can do. Computers have become an integral part of life and society. During any given day you are affected by computers, so start learning more about them with Volume 0. \$7.95.\*

● **VOL. I—BK1030—2nd Edition completely revised.** Dedicated to the basic concepts of microcomputers and hardware theory. The purpose of Volume I is to give you a thorough understanding of what microcomputers are. From basic concepts (which are covered in detail), Volume I builds the necessary components of a microcomputer system. This book highlights the difference between minicomputers and microcomputers. \$12.99.\*

● **VOL. II—BK1040 (with binder)**—Contains descriptions of individual microprocessors and support devices used only with the parent microprocessor. Volume II describes all available chips. \$31.99\*

● **VOL. III—BK1133 (with binder)**—Contains descriptions of all support devices that can be used with any microprocessor. \$21.99\*



## —SPECIAL INTERESTS—

new

● **THE CUSTOM TRS-80 AND OTHER MYSTERIES**—BK1218—by Dennis Kitz. More than 300 pages of TRS-80 customizing information. With this book you'll be able to explore your computer like never before. Want to turn an 8 track into a mass storage unit? Individual reverse characters? Replace the BASIC ROMs? Make Music? High speed, reverse video, Level I and Level II? Fix it if it breaks down? All this and much, much more. Even if you have never used a soldering iron or read a circuit diagram, this book will teach you how! This is the definitive guide to customizing your 80! \$29.95.\*

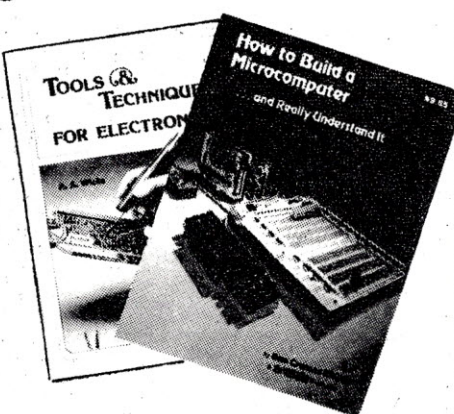
● **BASIC FASTER AND BETTER AND OTHER MYSTERIES**—BK1221—by Lewis Rosenfelder. You don't have to learn assembly language to make your programs run fast. With the dozens of programming tricks and techniques in this book you can sort at high speed, swap screens in the twinkling of an eye, write INKEY routines that people think are in assembly language and add your own commands to BASIC. Find out how to write elegant code that makes your BASIC really hum, and explore the power of USR calls. \$29.95.\*

● **TRS-80 DISK AND OTHER MYSTERIES**—BK1181—by Harvard C. Pennington. This is the definitive work on the TRS-80 disk system. It is full of detailed "How to" information with examples, samples and in-depth explanations suitable for beginners and professionals alike. The recovery of one lost file is worth the price alone. \$22.50.\*

● **MICROSOFT BASIC DECODED AND OTHER MYSTERIES**—BK1186—by James Favour. From the company that brought you TRS-80 DISK AND OTHER MYSTERIES! Contains more than 6500 lines of comments for the disassembled Level II ROMs, six additional chapters describing every BASIC subroutine, with assembly language routines showing how to use them. Flowcharts for all major routines give the reader a real insight into how the interpreter works. \$29.50.

● **THE CP/M HANDBOOK (with MP/M)**—BK1187—by Rodnay Zaks. A complete guide and reference handbook for CP/M—the industry standard in operating systems. Step-by-step instruction for everything from turning on the system and inserting the diskette to correct user discipline and remedial action for problem situations. This also includes a complete discussion of all versions of CP/M up to and including 2.2, MP/M and CDOS. \$14.95.\*

● **INTRODUCTION TO TRS-80 GRAPHICS**—BK1180—by Don Inman. Dissatisfied with your Level I or Level II manual's coverage of graphics capabilities? This well-structured book (suitable for classroom use) is ideal for those who want to use all the graphics capabilities built into the TRS-80. A tutorial method is used with many demonstrations. It is based on the Level I, but all material is suitable for Level II use. \$8.95.\*



● **TOOLS & TECHNIQUES FOR ELECTRONICS**—BK7348—by A. A. Wicks is an easy-to-understand book written for the beginning kit builder as well as the experienced hobbyist. It has numerous pictures and descriptions of the safe and correct ways to use basic and specialized tools for electronic projects as well as specialized metal working tools and the chemical aids which are used in repair shops. \$4.95.\*

● **HOW TO BUILD A MICROCOMPUTER—AND REALLY UNDERSTAND IT**—BK7325—by Sam Creason. The electronics hobbyist who wants to build his own microcomputer system now has a practical "How-To" guidebook. This book is a combination technical manual and programming guide that takes the hobbyist step-by-step through the design, construction, testing and debugging of a complete microcomputer system. Must reading for anyone desiring a true understanding of small computer systems. \$9.95.\*

\*Use the order card in this magazine or itemize your order on a separate piece of paper and mail to Kilobaud Microcomputing Book Department • Peterborough NH 03458. Be sure to include check or detailed credit card information.

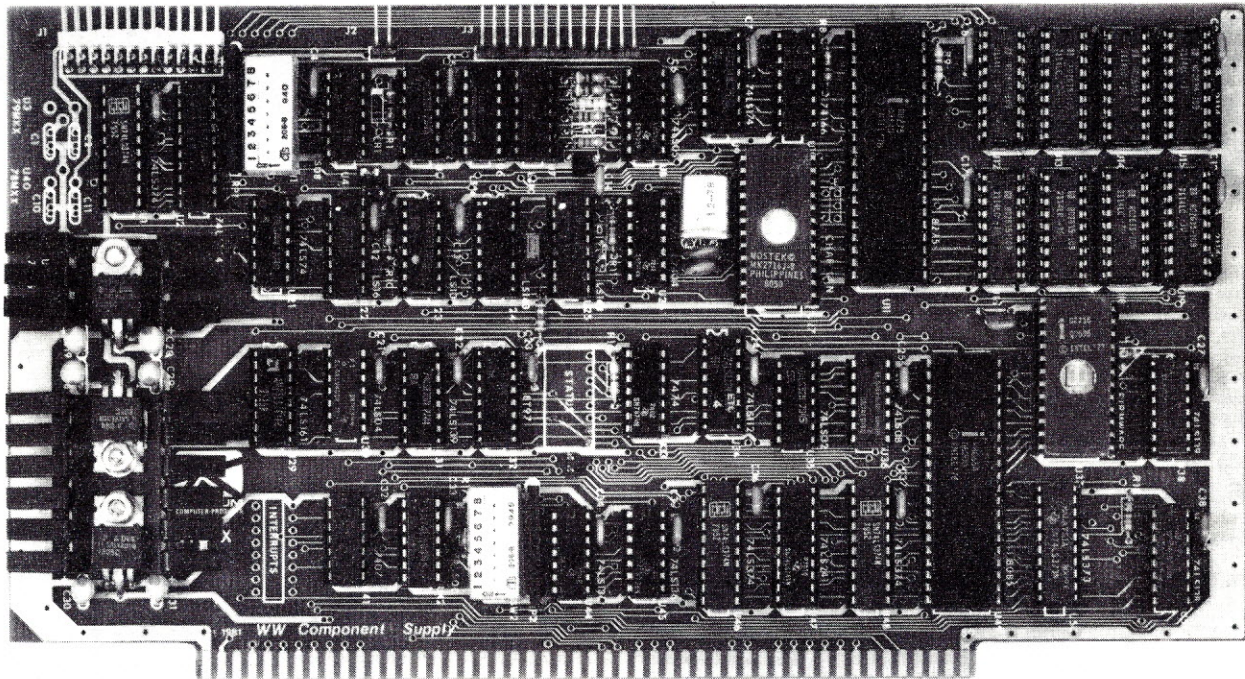
No C.O.D. orders accepted. All orders add \$1.50 for first book, \$1.00 each additional book, \$10.00 per book foreign airmail. Please allow 4-6 weeks for delivery. Questions regarding your order? Please write to customer Service at the following address.

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

**FOR TOLL FREE ORDERING CALL 1-800-258-5473**



# INTELLIGENT VIDEO I/O FOR S-100 BUS

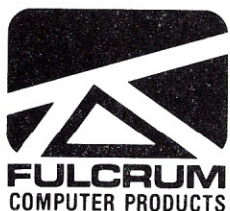


## VIO-X

The VIO-X Video I/O Interface for the S-100 bus provides features equal to most intelligent terminals both efficiently and economically. It allows the use of standard keyboards and CRT monitors in conjunction with existing hardware and software. It will operate with no additional overhead in S-100 systems regardless of processor or system speed.

Through the use of the Intel 8275 CRT controller with an onboard 8085 processor and 4k memory, the VIO-X interface operates independently of the host system and communicates via two ports, thus eliminating the need for host memory space. The screen display rate is effectively 80,000 baud.

The VIO-X1 provides an 80 character by 25 line format (24 lines plus status line) using a 5 × 7 character set in a 7 × 10 dot matrix to display the full upper and lower case ASCII alphanumeric 96 printable character set (including true descenders) with 32 special characters for escape and control characters. An optional 2732 character generator is available which allows an alternate 7 × 10 contiguous graphics character set.



Distributed by:

WW COMPONENT SUPPLY INC. 1771 JUNCTION AVENUE • SAN JOSE, CA 95112 • (408) 295-7171

The VIO-X2 also offers an 80 character by 25 line format but uses a 7 × 7 character set in a 9 × 10 dot matrix allowing high-resolution characters to be used. This model also includes expanded firmware for block mode editing and light pen location. Contiguous graphics characters are not supported.

Both models support a full set of control characters and escape sequences, including controls for video attributes, cursor location and positioning, cursor toggle, and scroll speed. An onboard Real Time Clock (RTC) is displayed in the status line and may be read or set from the host system. A checksum test is performed on power-up on the firmware EPROM.

Video attributes provided by the 8275 in the VIO-X include:

- FLASH CHARACTER
- INVERSE CHARACTER
- UNDERLINE CHARACTER or
- ALT. CHARACTER SET
- DIM CHARACTER

The above functions may be toggled together or separately.

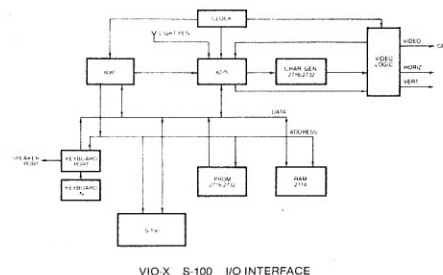
The board may be addressed at any port pair in the IEEE 696 (S-100) host system. Status and data ports may be swapped if necessary. Inputs are provided for parallel keyboard and for light pen as well as an output for audio signalling. The interrupt structure is completely compatible with Digital Research's MP/M ®.

Additional features include:

- HIGH SPEED OPERATION
- PORT MAPPED IEEE S-100 INTERFACE
- FORWARD/REVERSE SCROLL or
- PROTECTED SCREEN FIELDS
- CONVERSATIONAL or BLOCK MODE (opt)
- INTERRUPT OPERATION
- CUSTOM CHARACTER SET
- CONTROL CHARACTERS
- ESCAPE CHARACTER COMMANDS
- INTELLIGENT TERMINAL EMULATION
- TWO PAGE SCREEN MEMORY

VIO-X1 - 80 × 25 5 × 7 A & T **\$295.00**  
Conversational Mode

VIO-X2 - 80 × 25 7 × 7 A & T **\$345.00**  
Conversational & Block Modes



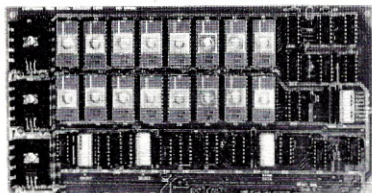
VIO-X S-100 I/O INTERFACE



# DIGITAL RESEARCH COMPUTERS

(214) 271-3538

## 32K S-100 EPROM CARD NEW!



**\$79.95**  
KIT

USES 2716's

Blank PC Board - \$34

ASSEMBLED & TESTED  
ADD \$30

SPECIAL: 2716 EPROM's (450 NS) Are \$9.95 Ea. With Above Kit.

### KIT FEATURES:

1. Uses +5V only 2716 (2Kx8) EPROM's.
2. Allows up to 32K of software on line!
3. IEEE S-100 Compatible.
4. Addressable as two independent 16K blocks.
5. Cromemco extended or Northstar bank select.
6. On board wait state circuitry if needed.
7. Any or all EPROM locations can be disabled.
8. Double sided PC board, solder-masked, silk-screened.
9. Gold plated contact fingers.
10. Unselected EPROM's automatically powered down for low power.
11. Fully buffered and bypassed.
12. Easy and quick to assemble.

## 32K SS-50 RAM

**\$299<sup>00</sup>** KIT

For 2MHZ  
Add \$10

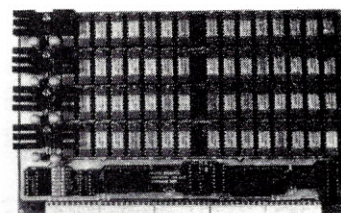
Blank PC Board  
\$50

For SWTPC  
6800 - 6809 Buss

Support IC's  
and Caps  
\$19.95

Complete Socket Set  
\$21.00

Fully Assembled,  
Tested, Burned In  
Add \$30



At Last! An affordable 32K Static RAM with full 6809 Capability.

### FEATURES:

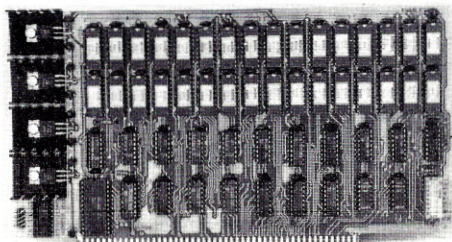
1. Uses proven low power 2114 Static RAM's.
2. Supports SS50C - EXTENDED ADDRESSING.
3. All parts and sockets included.
4. Dip Switch address select as a 32K block.
5. Extended addressing can be disabled.
6. Works with all existing 6800 SS50 systems.
7. Fully bypassed. PC Board is double sided, plated thru, with silk screen.

## 16K STATIC RAM KIT-S 100 BUSS

PRICE CUT!

**\$169<sup>95</sup>** KIT

FOR 4MHZ  
ADD \$10



### KIT FEATURES:

1. Addressable as four separate 4K Blocks.
2. ON BOARD BANK SELECT circuitry. (Cromemco Standard). Allows up to 512K on line!
3. Uses 2114 (450NS) 4K Static RAM's.
4. ON BOARD SELECTABLE WAIT STATES.
5. Double sided PC Board, with solder mask and silk screened layout. Gold plated contact fingers.
6. All address and data lines fully buffered.
7. Kit includes ALL parts and sockets.
8. PHANTOM is jumpered to PIN 67.
9. LOW POWER: under 1.5 amps TYPICAL from the +8 Volt Buss.
10. Blank PC Board can be populated as any multiple of 4K.

BLANK PC BOARD W/DATA-\$33

LOW PROFILE SOCKET SET-\$12

SUPPORT IC'S & CAPS-\$19.95

ASSEMBLED & TESTED-ADD \$35

**OUR #1 SELLING  
RAM BOARD!**

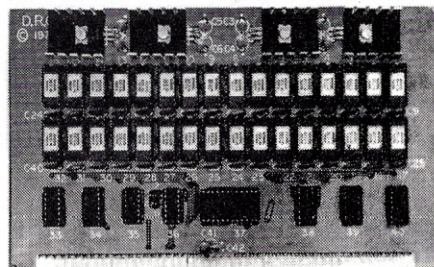
## 16K STATIC RAM SS-50 BUSS

PRICE CUT!

**\$159** KIT

FULLY STATIC!

FOR 2MHZ  
ADD \$10



FOR SWTPC  
6800 BUSS!

ASSEMBLED AND  
TESTED - \$35

### KIT FEATURES:

1. Addressable on 16K Boundaries
2. Uses 2114 Static Ram
3. Fully Bypassed
4. Double sided PC Board. Solder mask and silk screened layout
5. A/I Parts and Sockets included
6. Low Power: Under 1.5 Amps Typical

BLANK PC BOARD-\$35

COMPLETE SOCKET SET-\$12

SUPPORT IC'S AND CAPS-\$19.95

## NEW! S-100 SOUND COMPUTER BOARD

At last, an S-100 Board that unleashes the full power of two unbelievable General Instruments AY3-8910 NMOS computer sound IC's. Allows you under total computer control to generate an infinite number of special sound effects for games or any other program. Sounds can be called in BASIC, ASSEMBLY LANGUAGE, etc.

### KIT FEATURES:

- \* TWO GI SOUND COMPUTER IC'S.
- \* FOUR PARALLEL I/O PORTS ON BOARD.
- \* USES ON BOARD AUDIO AMPS OR YOUR STEREO.
- \* ON BOARD PROTO TYPING AREA.
- \* ALL SOCKETS, PARTS AND HARDWARE ARE INCLUDED.
- \* PC BOARD IS SOLDERMASKED, SILK SCREENED, WITH GOLD CONTACTS.
- \* EASY, QUICK, AND FUN TO BUILD. WITH FULL INSTRUCTIONS.
- \* USES PROGRAMMED I/O FOR MAXIMUM SYSTEM FLEXIBILITY.

Both Basic and Assembly Language Programming examples are included.

### SOFTWARE:

SCL™ is now available! Our Sound Command Language makes writing Sound Effects programs a SNAPI! SCL™ also includes routines for Register-Examine-Modify, Memory-Examine-Modify, and Play-Memory. SCL™ is available on CP/M compatible diskette or 2708 or 2716. Diskette - \$24.95 2708 - \$19.95 2716 - \$29.95. Diskette includes the source. EPROM'S are ORG at E000H. (Diskette is 8 inch Soft Sector)

### COMPLETE KIT!

**\$84<sup>95</sup>**

(WITH DATA MANUAL)

BLANK PC  
BOARD W/DATA  
\$31

## SPECIAL PURCHASE!

## UART SALE!

TR1602B - SAME AS TMS6011,  
AY5-1013, ETC. 40 PIN DIP

**TR1602B**

**\$2<sup>95</sup>** EACH

**4 For \$10<sup>00</sup>**

### CRT CONTROLLER CHIP

SMC #CRT 5037. PROGRAMMABLE FOR 80 x 24, ETC. VERY RARE  
SURPLUS FIND. WITH PIN OUT. \$12.95 EACH.

### NEW! G.I. COMPUTER SOUND CHIP

AY3-8910. As featured in July, 1979 BYTE! A fantastically powerful Sound & Music Generator. Perfect for use with any 8 Bit Microprocessor. Contains: 3 Tone Channels, Noise Generator, 3 Channels of Amplitude Control, 16 bit Envelope Period Control, 2-8 Bit Parallel I/O, 3 D to A Converters, plus much more! All in one 40 Pin DIP. Super easy interface to the S-100 or other busses. **\$11.95** PRICE CUT!

SPECIAL OFFER: ~~\$14.95~~ each Add \$3 for 60 page Data Manual.

TERMS: Add \$2.00 postage. We pay balance. Orders under \$15 add 75¢ handling. No C.O.D. We accept Visa and MasterCard. Tex. Res. add 5% Tax. Foreign orders (except Canada) add 20% P & H. Orders over \$50, add 85¢ for insurance.

### 4K STATIC RAM

National Semi. MM5257. Arranged 4K x 1. +5V, 18 PIN DIP. A Lower Power, Plug in Replacement for TMS 4044. 450 NS. Several Boards on the Market Will Accept These Rams. SUPER SURPLUS PURCHASE! PRIME NEW UNITS!

8 FOR \$16 32 FOR \$59.95

**Digital Research Computers**  
(OF TEXAS)

P.O. BOX 401565 • GARLAND, TEXAS 75040 • (214) 271-3538

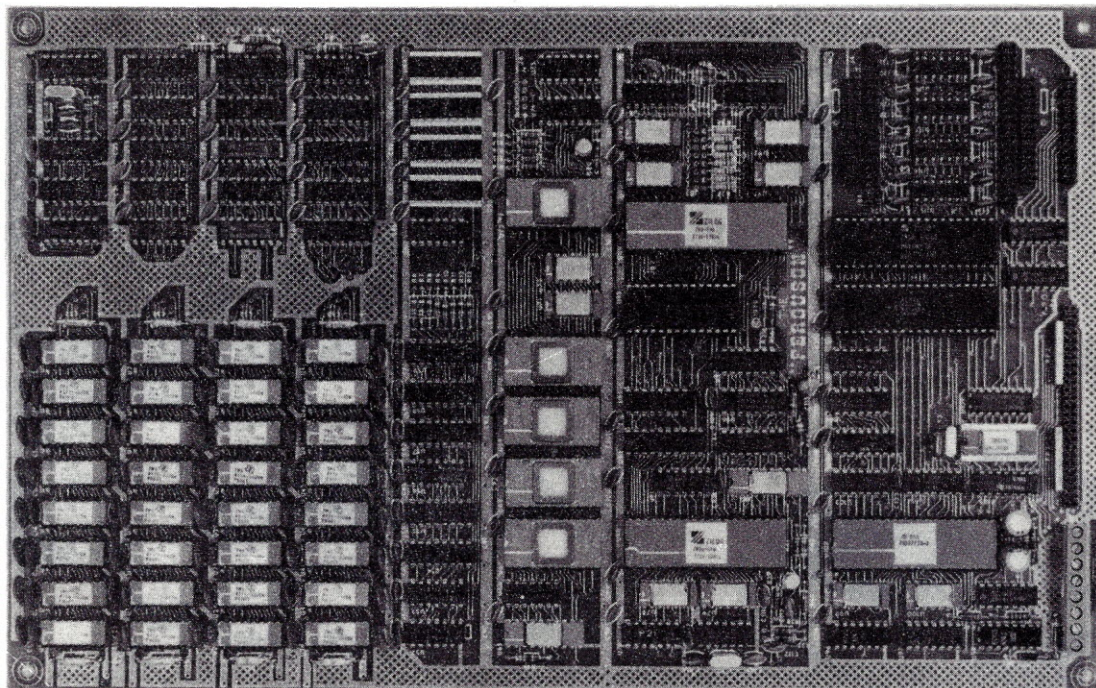


**NEW!**

**"THE BIG BOARD"**  
 OEM - INDUSTRIAL - BUSINESS - SCIENTIFIC  
**SINGLE BOARD COMPUTER KIT!**  
**Z-80 CPU! 64K RAM!**

**NEW!**

**PARTIALLY ASSEMBLED KITS**  
 For All Sockets Installed  
 And Soldered Add \$50.



**THE FERGUSON PROJECT:** Three years in the works, and maybe too good to be true. A tribute to hard headed, no compromise, high performance, American engineering! The Big Board gives you all the most needed computing features on one board at a very reasonable cost. The Big Board was designed from scratch to run the latest version of CP/M\*. Just imagine all the off-the-shelf software that can be run on the Big Board without any modifications needed! Take a Big Board, add a couple of 8 inch disc drives, power supply, an enclosure, C.R.T., and you have a total Business System for about 1/3 the cost you might expect to pay.

**\$649<sup>00</sup>** \*\*

(64K KIT  
BASIC I/O)

SIZE: 8 1/2 x 13 3/4 IN.  
 SAME AS AN 8 IN. DRIVE.  
 REQUIRES: +5V @ 3 AMPS  
 + - 12V @ .5 AMPS.

**FULLY SOCKETED!****FEATURES: (Remember, all this on one board!)****64K RAM**

Uses industry standard 4116 RAM'S. All 64K is available to the user, our VIDEO and EPROM sections do not make holes in system RAM. Also, very special care was taken in the RAM array PC layout to eliminate potential noise and glitches.

**Z-80 CPU**

Running at 2.5 MHZ. Handles all 4116 RAM refresh and supports Mode 2 INTERRUPTS. Fully buffered and runs 8080 software.

**SERIAL I/O (OPTIONAL)**

Full 2 channels using the Z80 SIO and the SMC 8116 Baud Rate Generator. FULL RS232! For synchronous or asynchronous communication. In synchronous mode, the clocks can be transmitted or received by a modem. Both channels can be set up for either data-communication or data-terminals. Supports mode 2 Int. Price for all parts and connectors: \$85.

**BASIC I/O**

Consists of a separate parallel port (Z80 PIO) for use with an ASCII encoded keyboard for input. Output would be on the 80 x 24 Video Display.

**24 x 80 CHARACTER VIDEO**

With a crisp, flicker-free display that looks extremely sharp even on small monitors. Hardware scroll and full cursor control. Composite video or split video and sync. Character set is supplied on a 2716 style ROM, making customized fonts easy. Sync pulses can be any desired length or polarity. Video may be inverted or true. 5 x 7 Matrix - Upper & Lower Case

**FLOPPY DISC CONTROLLER**

Uses WD1771 controller chip with a TTL Data Separator for enhanced reliability. IBM 3740 compatible. Supports up to four 8 inch disc drives. Directly compatible with standard Shugart drives such as the SA800 or SA801. Drives can be configured for remote AC off-on. Runs CP/M\* 2.2.

**TWO PORT PARALLEL I/O (OPTIONAL)**

Uses Z-80 PIO. Full 16 bits, fully buffered, bi-directional. User selectable hand shake polarity. Set of all parts and connectors for parallel I/O: \$29.95

**REAL TIME CLOCK (OPTIONAL)**

Uses Z-80 CTC. Can be configured as a Counter on Real Time Clock. Set of all parts: \$14.95

**SYSTEM COMPARISON**

64K RAM KIT	\$370.00	Talk about bangs per buck! The prices shown for \$100 kits were taken from the July 1980 BYTE. This will give some basis for comparison between the Big Board and a similar system implementation on the \$100 Buss.
80 x 24 Video Kit	365.00	
Floppy Disk Controller Kit	235.00	
Z-80 CPU KIT	185.95	
SER & PAR. I/O	129.95	
S-100 Mother Board	45.00	
<b>SUB TOTAL</b>	<b>\$1330.90</b>	

**CP/M\* 2.2 FOR BIG BOARD**

The popular CP/M\* D.O.S. modified by MICRONIX SYSTEMS to run on Big Board is available for \$150.00.

**PC BOARD**

Blank PC Board with Rom Set and Full Documentation.  
 \$199.00

**PFM 3.0 2K SYSTEM MONITOR**

The real power of the Big Board lies in its PFM 3.0 on board monitor. PFM commands include: Dump Memory, Boot CP/M\*, Copy, Examine, Fill Memory, Test Memory, Go To, Read and Write I/O Ports, Disc Read (Drive, Track, Sector), and Search. PFM occupies one of the four 2716 EPROM locations provided. Z-80 is a Trademark of Zilog.

**Digital Research Computers**  
 (OF TEXAS)

P.O. BOX 401565 • GARLAND, TEXAS 75040 • (214) 271-3538

**TERMS:** Shipments will be made approximately 3 to 6 weeks after we receive your order. VISA, MC, cash accepted. We will accept COD's (for the Big Board only) with a \$75 deposit. Balance UPS COD. Add \$3.00 shipping.

USA AND CANADA ONLY

\*TRADEMARK OF DIGITAL RESEARCH. NOT ASSOCIATED WITH DIGITAL RESEARCH OF CALIFORNIA, THE ORIGINATORS OF CPM SOFTWARE  
 \*\*1 TO 4 PIECE DOMESTIC USA PRICE.



# ELECTRONICS CENTER

CALL TOLL FREE

## 1-800-228-4097

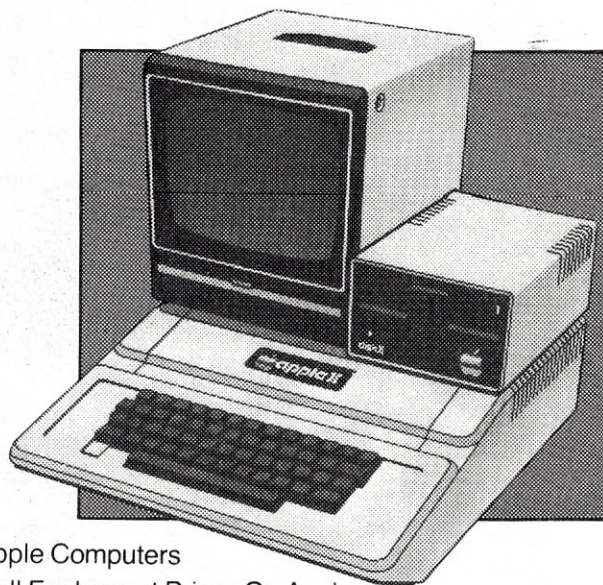
Commodore Computers



CALL FOR LOWEST PRICES



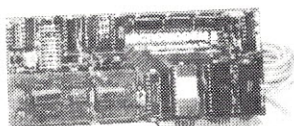
EPSON Printers  
CALL FOR PRICE



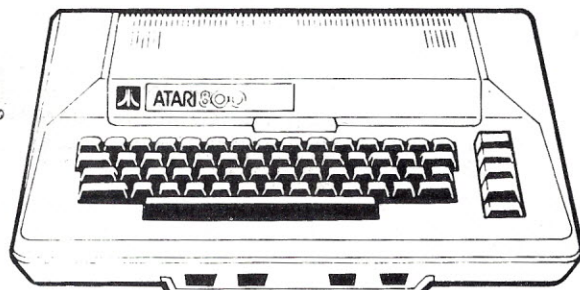
Apple Computers  
Call For Lowest Prices On Apple



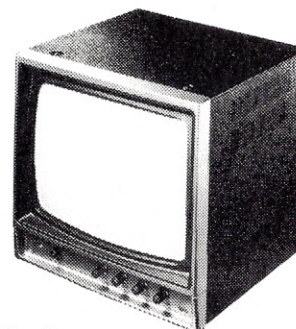
Commodore Computers  
Call Toll Free For Price



DC Hayes Micromodem II  
CALL FOR PRICES



Atari Computers ◀ Our Atari Prices Can't Be Beat!



NEC Monitors

9" NEC Monitor .....	\$139.95
12" NEC Monitor .....	\$179.95
12" Green Screen .....	CALL
13" NEC Color Monitor With Tuner .....	\$499.95
19" NEC Color Monitor .....	\$499.95

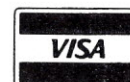
PRICES SUBJECT TO CHANGE AND AVAILABILITY

### YOUR

WE TRADE — WE EXPORT

## ELECTRONICS PLAYGROUND

1840 "O" Street Lincoln, Nebraska 68508  
In Nebraska Call (402) 476-7331





# Why use their flexible discs:

Athana, BASF, Control Data, Dysan, IBM, Maxell, Nashua, Scotch, Shugart, Syncom, 3M, Verbatim or Wabash

when you could be using

# MEMOREX

for as low as \$1.94 each?

Find the flexible disc you're now using on our cross reference list... then write down the equivalent Memorex part number you should be ordering.

Product Family	Product Description	Memorex Part Number (3201-1)	CE quant. 100 price per disc (\$)	Athana	BASF	Dysan	IBM	Maxell	Nashua	Scotch 3M	Shugart	Syncom	Verbatim	Wabash	Control Data
Flexible Disc 1x Single-Density Media	IBM Compatible (128 B/S, 26 Sectors)	3060	1.99	473071	53428	800906	2305830	FD1-128	FD-1	740-0	S/A 100	15002	FD34-9000	F111111X	421802
	IBM Compatible (128 B/S, 26 Sectors) w/ W.P.N. & Hub Ring	3062	2.04	—	—	—	—	—	—	740-0	—	—	FD34-9000	—	—
	IBM Compatible (128 B/S, 26 Sectors) REVERSIBLE	1729	3.19	473072	54431	—	—	—	FD-2	740/2-0	—	15150	FD34-9000	F171111X	—
	IBM System 6 Compatible	3066	2.04	473077	54561	800509	1669959	—	—	740-0 056	—	15003	FD60-9000	F116111X	—
	IBM Compatible (128 B/S, 15 Sectors)	3109	1.99	473073	—	800584	2305845	—	—	740-3600	—	15005	FD38-9000	F112111X	—
	IBM Compatible (1512 B/S, 8 Sectors)	3110	1.99	473074	—	800585	1669954	—	—	—	—	15004	FD60-9000	F113111X	—
	Shugart Compatible, 32 Hard Sector	3015	1.99	470901	53002	101/1	—	FH1-32	FD-132	740-32	S/A-101	15025	FD32-9000	—	421322
	Wang Compatible, 32 Hard Sector w/Hub Ring	3087	2.49	—	54491	—	—	—	—	740-32RH	—	—	—	F37A411X	—
	CPI 8000 Compatible	3045	2.69	—	—	—	—	—	—	—	—	15226	—	—	—
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Flexible Disc 1d Double-Density Media	IBM Compatible (128 B/S, 26 Sectors)	3090	2.69	474071	54568	3740/1D	—	FD1-128/M2 100	FD-1D	741-0	—	—	FD34-8000	F131111X	423002
	Soft Sector (128 B/S, 26 Sectors) REVERSIBLE	3093	3.69	—	—	—	—	—	—	—	—	—	—	—	—
	Shugart Compatible, 32 Hard Sector	3091	2.69	470801	54598	101/1D	—	FH1-32D	—	741-32	S/A-103	15075	F332-8000	F33A411X	423322
	Wang Compatible, 32 Hard Sector w/Hub Ring	3088	3.09	—	—	—	—	—	—	—	—	—	—	—	—
Flexible Disc 2x Double-Density Media	Soft Sector (128 B/S, 26 Sectors)	3113	3.09	—	54428	800814	1766870	—	—	—	S/A-150	15153	FD10-4026	F121111X	—
	Soft Sector (128 B/S, 15 Sectors)	3106	3.09	473477	54225	800815	2736700	FD2-256D	—	742-0	—	15154	FD10-4015	F122111X	424612
Flexible Disc 2d Double-Density Media	Soft Sector (Unformatted)	3102	3.09	473485	—	0Y150	—	FD2-XDM	FD-2D	743-0	—	15103	DD34-4001	—	425002
	Soft Sector (128 B/S, 26 Sectors)	3116	3.09	—	—	—	—	—	—	—	S/A-150	—	—	—	—
	Soft Sector (256 B/S, 26 Sectors)	3103	3.09	473471	54325	800817	1766872	FD2-256D	—	743-0/256	—	15101	DD34-4026	F144111X	425802
	Soft Sector (512 B/S, 15 Sectors)	3114	3.09	473472	54479	800818	1669044	—	—	743-0/512	—	15100	DD34-4015	F145111X	425812
	Soft Sector (1024 B/S, 8 Sectors)	3104	3.09	473473	54485	800819	1669045	—	—	743-0/1024	—	15102	DD34-4008	F147111X	425822
	32 Hard Sector	3105	3.09	470851	—	101/2D	—	FH2-32D	—	743-32	S/A-151	15125	DD32-4000	F34A411X	425322
	Burnough B-80 Compatible, 32 Hard Sector	3092	3.09	—	—	—	—	—	—	—	—	—	—	—	—
	Soft Sector (1024 B/S, 8 Sectors) w/ Hub Ring	3118	3.49	—	—	—	—	—	—	—	—	—	—	F34A811X	—
	Shugart Compatible, 32 Hard Sector	3181	3.39	—	—	—	—	—	—	—	—	—	DD32-4000	—	—
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Flexible Disc FD Memorex 651 or Equiv. Drive Compatible	FD VI (Vinyl Jacket)	30712003	2.69	470651	—	FDIV	—	—	FD-16S	511-0	—	15026	FD65-1000	F81A111X	—
Mini Flexible Disc 1x 5 1/4" Single-Headed Drives Single-Density Media	Soft Sector (Unformatted)	3401	1.94	475001	54256	104/1	—	MD1	MD 1	744-0	S/A-104	15300	MD525-01	M11A211X	441002
	10 Hard Sector	3403	1.94	475010	54257	107/1	—	—	MD 110	744-10	S/A-107	15325	MD525-10	M41A211X	441102
	18 Hard Sector	3405	1.94	475016	54258	105/1	—	—	MD 116	744-16	S/A-105	15326	MD525-16	M51A211X	441162
	Soft Sector (Unformatted) w/Hub Ring	3431	2.14	—	—	—	—	—	—	—	—	—	MD525-01	—	—
	10 Hard Sector w/Hub Ring	3433	2.14	—	—	—	—	—	—	—	—	—	MD525-10	—	—
	16 Hard Sector w/Hub Ring	3435	2.14	—	—	—	—	—	—	—	—	—	MD525-16	—	—
Mini Flexible Disc 1d 5 1/4" Single-Headed Drives Double-Density Media	Soft Sector (Unformatted)	3417	2.14	—	54646	104/1D	—	—	—	—	—	—	MD525-01	—	—
	10 Hard Sector	3418	2.14	—	54649	107/1D	—	—	—	—	—	—	MD525-10	—	—
	18 Hard Sector	3419	2.14	—	54652	105/1D	—	—	—	—	—	—	MD525-16	—	—
	Soft Sector (Unformatted) w/Hub Ring	3461	2.34	—	—	—	—	—	—	—	—	—	MD525-01	—	—
	10 Hard Sector w/Hub Ring	3463	2.34	—	—	—	—	—	—	—	—	—	MD525-10	—	—
	16 Hard Sector w/Hub Ring	3465	2.34	—	—	—	—	—	—	—	—	—	MD525-16	—	—
Mini Flexible Disc 2d 5 1/4" Double-Headed Drives Double Density Media	Soft Sector (Unformatted)	3421	2.59	—	54624	104/2D	—	—	—	—	S/A-154	—	MD550-01	—	—
	10 Hard Sector	3423	2.59	—	54627	107/2D	—	—	—	—	S/A-157	—	MD550-10	—	—
	16 Hard Sector	3425	2.59	—	54630	105/2D	—	—	—	—	S/A-155	—	MD550-16	—	—
	Soft Sector (Unformatted) w/Hub Ring	3491	2.79	—	—	—	—	—	—	—	—	—	MD550-01	—	—
	10 Hard Sector w/Hub Ring	3493	2.79	—	—	—	—	—	—	—	—	—	MD550-10	—	—
	16 Hard Sector w/Hub Ring	3495	2.79	—	—	—	—	—	—	—	—	—	MD550-16	—	—

## Memorex Flexible Discs...The Ultimate in Memory Excellence

### Quality

Memorex means quality products that you can depend on. Quality control at Memorex means starting with the best materials available. Continual surveillance throughout the entire manufacturing process. The benefit of Memorex's years of experience in magnetic media production, resulting, for instance, in proprietary coating formulations. The most sophisticated testing procedures you'll find anywhere in the business.

### 100 Percent Error Free

Each and every Memorex Flexible Disc is certified to be 100 percent error free. Each track of each flexible disc is tested, individually, to Memorex's stringent standards of excellence. They test signal amplitude, resolution, low-pass modulation, overwrite, missing pulse error and extra pulse error. They are torque-tested, and competitively tested on drives available from almost every major drive manufacturer in the industry including drives that Memorex manufactures. Rigid quality audits are built into every step of the manufacturing process and stringent testing result in a standard of excellence that assures you, our customer, of a quality product designed for increased data reliability and consistent top performance.

### Customer-Oriented Packaging

Memorex's commitment to excellence does not stop with a quality product. They are proud of their flexible discs and their packaging them with pride. Both their packaging and their labeling have been designed with your ease of identification and use in mind. The desk-top box containing ten discs is convenient for filing and storage. Both box labels and jacket labels provide full information on compatibility, density, sectoring, and record length. Envelopes with multi-language care and handling instructions and color-coded removable labels are included. A write-protect feature is available to provide data security.

### Full One Year Warranty — Your Assurance of Quality

Memorex Flexible Discs will be replaced by Memorex if they are found to be defective in materials or workmanship within one year of the date of purchase. Other than replacement, Memorex will not be responsible for any damages or losses (including consequential damages) caused by the use of Memorex Flexible Discs.

### Quantity Discounts Available

Memorex Flexible Discs are packed 10 discs to a carton and 10 cartons to a case. Please order only in increments of 100 units for quantity 100 pricing. We are also willing to accommodate your smaller orders. Quantities less than 100 units are available in increments of 10 units at a 10% surcharge. Quantity discounts are also available. Order 500 or more discs at the same time and deduct 1%; 1,000 or more saves you 2%; 2,000 or more saves you 3%; 5,000 or more saves you 4%; 10,000 or more saves you 5%; 25,000 or more saves you 6%; 50,000 or more saves you 7% and 100,000 or more discs earns you an 8% discount off our super low quantity 100 price. Almost all Memorex Flexible Discs are immediately available from CE. Our warehouse facilities are equipped to help us get you the quality product you need, when you need it. If you need further assistance to find the flexible disc that's right for you, call the Memorex compatibility hotline. Dial 800-538-8080 and ask for the flexible disc hotline extension 0997. In California dial 800-672-3525 extension 0997.

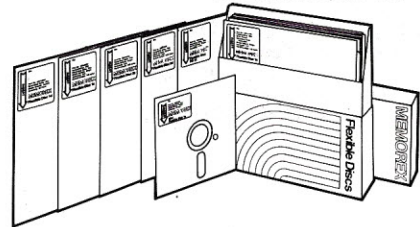
### Buy with Confidence

To get the fastest delivery from CE of your Memorex Flexible Discs, send or phone your order directly to our Computer Products Division. Be sure to calculate your price using the CE prices in this ad. Michigan residents please add 4% sales tax. Written purchase orders are accepted from approved government agencies and most well rated firms at a 10% surcharge for net 10 billing. All sales are subject to availability, acceptance and verification. All sales are final. Prices, terms and specifications are subject to change without notice. Out of stock items will be placed on backorder automatically unless CE is instructed differently. Minimum order \$50.00. International orders are invited with a \$20.00 surcharge for special handling in addition to shipping charges. All shipments are F.O.B. Ann Arbor, Michigan. No COD's please. Non-certified and foreign checks require bank clearance.

Mail orders to: Communications Electronics, Box 1002, Ann Arbor, Michigan 48106 U.S.A. Add \$8.00 per case or partial-case of 100 8-inch discs or \$6.00 per case of 100 5 1/4-inch mini-discs for U.S. ground shipping and handling in the continental U.S.A. If you have a Master Card or Visa card, you may call anytime and place a credit card order. Order toll-free in the United States. Call anytime 800-521-4414. If you are outside the U.S. or in Michigan, dial 313-994-4444. Dealer inquiries invited. All order lines at Communications Electronics are staffed 24 hours. Copyright ©1981 Communications Electronics™



**Order Toll-Free!**  
**(800) 521-4414**  
In Michigan (313) 994-4444



For Data Reliability—Memorex Flexible Discs

**COMMUNICATIONS ELECTRONICS™** 376

**Computer Products Division**

854 Phoenix □ Box 1002 □ Ann Arbor, Michigan 48106 U.S.A.  
Call TOLL-FREE (800) 521-4414 or outside U.S.A. (313) 994-4444



## PRINTERS

**10 DAY  
FREE RETURN**

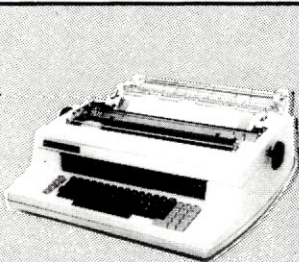
### EPSON MX-80 Now in stock!

The MX-80 dot matrix printer. Unequalled Epson reliability. Has all the features of the MX-70 plus more power and extra functions.

**C-ITOH STARWRITER: LETTER QUALITY PRINTING FOR UNDER \$2000!** This daisywheel printer gives high quality at a low price. 25 cps. Parallel and serial interfaces available.

**NEW INTEGRAL DATA'S 560 PRINTER** All the exciting features of the 400 series plus 14 1/2" paper capacity. 132 col. graphics printer. **IDS 445.** Priced lower than the 440 and equipped with a better print head. With & w/o graphics. **IDS 460.** Features include correspondence quality printing, high resolution graphics.

**NEC SPINWRITER FROM THE FIRST NAME IN LETTER QUALITY PRINTERS/**



Spinwriter 5520

Compumart offers beautiful print quality with NEC Spinwriter Terminals. We carry all models from RO THRU KSR WITH NUMERIC KEYPAD—5510-5530. All versions give unsurpassed hard copy output!

### CENTRONICS PRINTERS 3 SERIAL MODEL 737

The closest thing to letter quality print for under \$1000.

List \$1045 **SPECIAL \$795.**  
737-1 Parallel Interface  
List \$995 **SALE PRICE \$695.**  
**PLUS EXCITING REBATE OFFER ON CENTRONICS PRINTERS.**

### OMNI 810 PRINTER FROM TEXAS INSTRUMENTS CALL US

The 820 RO PACKAGE includes machine mounted paper tray and cable. A compressed print option and device forms control are standard features.

THE 820 KSR PACKAGE includes fully ASCII Keyboard plus all of the features of the RO.

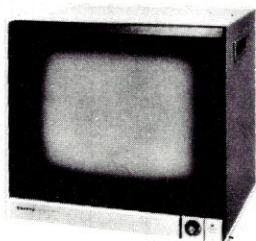
## MONITORS TERMINALS CONFIGURATION HELP

### CLEARANCE ZENITH COLOR VIDEO MONITOR \$349.

**SUPER SELLING TERMINALS FROM LEAR SIGLER/** We have the following Lear Siegler terminals in stock at prices too low to print! Call for quotes.

**ADM-3A/** Industry's favorite dumb terminal for some very smart reasons/ **ADM-3A + NEW** from Lear Siegler. CALL! IT IS HERE! It is the new Intermediate Terminal from Lear Siegler.

**NEC COLOR MONITOR/RECEIVER HIGH RESOLUTION/** Composite video using BNC connectors, 8-Pin connector for VCR/ VTR video loop In/Out and television reception.



Sanyo 13" Color Monitor

**SANYO MONITORS AT LOW COMPUMART PRICES/** Sanyo's new line of CRT data display monitors are designed for the display of alphanumeric or graphic data.

9" SANYO B/W \$169.  
12" SANYO B/W  
12" SANYO W/  
GREEN SCREEN  
13" SANYO COLOR

### Visit our giant ANN ARBOR STORE

1250 North Main Street  
Ann Arbor, Michigan

### FREE CATALOGS MICRO DEC PDP/

The original and most complete catalog of micro-computers, accessories and peripherals.

**LSI-11** Systems configured and integrated with other manufacturers compatibles. The first, best DEC based systems catalog.

**Send for them!**

## CALCULATORS MISC TOLL FREE ORDERING

### NOVATION CAT ACOUSTIC MODEM Answer Originate.

NEW! D-CAT Direct Connect Modem: from Novation.

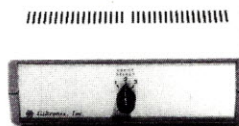
**MATROX PRODUCTS/** Compumart stocks the complete line.

**DYSAN DISKETTES/** Single side, single density. Hard or Soft Sector \$5. ea.

**MEMOREX 3401's/** 5 1/4" disks \$3.25.  
/with hub ring for Apple \$3.50.

**MEMORY INTEGRATED CIRCUITS/** Call for quantity discounts when ordering over 50 units.

**MOTOROLA 4116 (200 Nano-second Plastic)** \$4.50



Giltronix Switch

**NEW! GILTRONIX RS 232 SWITCH/** The ultimate in flexibility. You can connect three peripherals to one computer or three computers to one peripheral. Switches the eight most important RS 232 signals.

**DEC LSI-11/** Compumart now offers the entire product line. **CALL FOR PRICES AND DELIVERY**

**HP-41C CALCULATORS MEMORY MODULES** for storing programs of up to 2000 lines of program memory. **"EXTRA SMART" CARD READER.** Records programs and data back onto blank magcards. **THE PRINTER.** Upper and lower case. High resolution plotting. Portable thermal operation. **APPLICATION MODULES**

**NEW SUPER 41-CV SYSTEMS** with Quad RAMS built-in. Maximum memory on-board leaves slots open for Application Pacs and peripherals. **+ CARD READER + CARD READER + PRINTER** QUAD RAMS equivalent to four Memory Modules all packed in one.

## SYSTEMS SOFTWARE LEASING AVAILABLE

### RM EXPANSION ACCESSORIES FOR AIM— CALL SPECS AND PRICES

**APPLE III IS IN STOCK/Apple III** Information Analyst Package—128K Apple III, Black and White Monitor 12", and information analyst software.

### TOP SOFTWARE PACKAGES FROM COMPUMART

**VISICALC/** FOR APPLE/ FOR HP/ FOR COMMODORE/ FOR ATARI

**SOFTWARE FROM APPLE/** Apple Plot (the perfect graphic complement for Visicalc/Dow Jones News & Quotes/Apple Fortrom/Apple Writer/Pascal Language System/Controller Business System

**PERSONAL SOFTWARE/** Visidex/ VisiTrend/VisiPlot/VisiTerm MUSE/Super Text



Apple Software

### MOUNTAIN COMPUTER/

Expansion accessories for Apple/ Super Talker/The Music System/ ROM plus board with Keyboard filter/ROM Writer/Clock Calendar/Atod and D to A Converter/ Clock for Apple/CPS Multifunction Board

**VIDEX/** Video Term (80 col. x 24 line, 7x9 Matrix plug in compatible board for Apple II) w/wo graphics EPROM/SSM Serial & Parallel, Apple Interface/ABT's Numeric Key Plan/California Microcomputer Keyboard

**NEW!  
VIC 20 PERSONAL COMPUTER  
FROM COMMODORE**

\$299.

### IMPORTANT ORDERING INFORMATION

**CALL:** 800 343-5504, in Massachusetts (617) 491-2700, phones open from 8:30 a.m. to 7:00 p.m. Mon-Fri. 11:00 a.m. to 4:00 p.m. Sat. **PO's:** Accepted from Dun & Bradstreet rated companies—shipment

contingent upon receipts of signed purchase order.

**SALE PRICES:** Valid for month of magazine date only—all prices subject to change without notice. Our Ann Arbor retail store is open 11:00 a.m. to 7:00 p.m. Tues-Fri, 10:00 a.m. to 5:00 p.m. on Saturdays.



SYSTEMS

**APPLE II  
STARTER****\$1895**

**SAVE OVER \$200 ON OUR BEST SELLING APPLE SYSTEM/** System includes a 48K Apple II, Apple Disk, DOS 3.3 and Controller and a Sup R MOD RF Modulator.

List \$2209.

**EXCLUSIVE FOR THE APPLE:** Magic Wand, Videx, Z-80 softcard (Requires 48K Apple and disk).

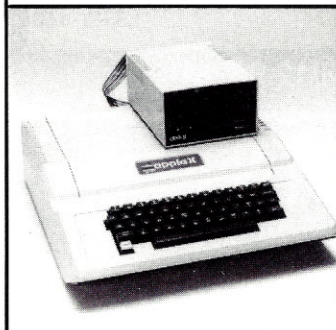
**COMPLETE SUB-SYSTEM \$925.****APPLE ACCESSORIES**

**CHOOSE FROM:** Silentyne Printer w/x face/Light Pen/Easy Writer (80 col. need a Videx)/Clock for Apple.

**FROM MICROSOFT:** 16K RAM Board/FORTRAN.

**FROM COMPUTER STATION:** Hi-Res Dump for 460 Printer.

**OUR APPLE INVENTORY IS COMPLETE. WE'VE GOT IT ALL—**



**apple computer**  
Authorized Dealer  
Accept No Less

SYSTEMS

**CORVUS  
NETWORK**

**CONSTELLATION** Backend Network with up to 64 CPUs.

**MIRROR** Videotape backup and up to 20Mb storage.

**CALL US FOR PRICES ON YOUR SPECIFIC CONFIGURATION.**

**XEROX  
820 IS  
HERE**

**CALL US FOR PRICES ON YOUR SPECIFIC CONFIGURATION.**



SYSTEMS

**AIM 65  
STARTER****\$795**

FROM ROCKWELL

**THE SMALL SYSTEM FOR CHRISTMAS BUYING**

Our AIM Starter System for Educational & Laboratory use includes **4K AIM/BASIC & ROM/ASSEMBLER & ROM/POWER SUPPLY EGI ENCLOSURE/CRAIG TAPE RECORDER.**

**ACCESSORIES FOR AIM STARTER:** PL 65 High Level Language/Paper for the Aim (roll)/Rockwell's 4 slot Motherboard/

**WE ALSO CARRY RM EXPANSION ACCESSORIES FOR THE AIM-65.**



**Rockwell International**  
Authorized Dealer  
Accept No Less

**800-343-5504**

IN MASS CALL 617-491-2700

Systems  
*Customized*

**COMPUMART**

✓ 43

65 Bent Street, Dept 131

PO Box 568, Cambridge, MA 02139

From THE LEADER...

We just might be the largest independent small systems dealer in the country. Here's why: COMPUMART has been serving the computer needs of industry since 1971.

We stock, for immediate shipment, only those products from the finest micro-computer manufacturers.

And any product, except software, can be returned within 10 days for a full refund—even if you just change your mind. We also honor all manufacturers' warranties. Our expert technicians will service any product we sell.

Call us for more information on products, product configuration and service. Our phones are open Monday thru Friday, 8:30 a.m. to 7:00 p.m. and Saturday 11:00 a.m. to 4:00 p.m.

We have a staff of highly knowledgeable sales people waiting to hear from you, and to help. Because service is what we're all about.





# B.G. MICRO

P.O. Box 280298 Dallas, Texas 75228  
(214) 271-5546

\*Visa\* MasterCard\* American Express\*

Terms \$1.50 postage, handling, orders over \$50.00 add .85 for insurance. Texas residents add 5% sales tax.

## STATIC RAM

\*21L02-1KX1 250 n.s.  
Low Power ..... .95  
2114L-3 1KX4 300 n.s.  
Low Power... 2.95 8/\*22.00  
MM5257 (TMS4044) 4KX1  
450 n.s. .... 2.95  
HM6116P-4-2KX8 + 5v-200 n.s.  
CMOS Low Power 2716  
Style Pin Out. 14.95 8/\*105.00  
6514 J-5 1KX4-CMOS Super  
Low Power Similar to 350 n.s.  
2114 Same Pin Out ... 2.95  
TMM2016-2KX8 + 5v-NMOS  
200 n.s.-2716 Style Pin  
Out ..... 14.95 8/\*105.00

## DYNAMIC RAM

2107B-4 (MM5280N-5)-4KX1  
22 pin ..... 1.59  
4027-4KX1-250 n.s. .... 1.75  
\*4116-16KX1-300n.s.. 8/12.95  
\*4116-16KX1-200 n.s.. 8/15.95  
HM4164 + 5v 64K Dynamic  
Call or Write For  
Super Low Prices

## EPROM

\*Asterik Denotes Super Specials  
\*1702A 256X8 1 us 2.50  
2708 1KX8 450 n.s. 2.95  
27A08 1KX8 350 n.s. 3.95  
\*2716 2KX8 + 5v 450 n.s. 5.95  
\*2716-1 2KX8 + 5v 350 n.s. 9.95  
\*2732 4KX8 450 n.s. 14.95  
Intel Pin Out  
\*2532 4KX8 450 n.s. 14.95  
T.I. Pin Out

## Z-80

Z80A-4MHZ CPU ..... \$8.95  
Z80PIO-Parallel ..... \$5.95  
Z80SIO-Z-80 2 Chan. Ser. . \$24.95  
\*Z80DMA-DMA Controller \$9.95

## 80 80 SUPPORT

8216 Buffer \$1.95  
8251 USAR \$4.95  
8253 Baud Rate Gen. \$8.95

## MISCELLANEOUS

\*TR1602-UART same as  
AY5-1013 ..... \$1.99  
\*IM6402- + 5v. High speed  
UART-AY5-1013 pin out \$3.95  
\*MC1488-1489-RS232 Receiver  
and drive H.#. ... pair \$1.19  
AY3-8910-Sound Chip with 60  
page data manual ... \$12.95  
82S123-32X8 Tri State Bi polar  
PROM ..... \$3.99  
\*555-timer ..... 5/\$1.10

## BIT SLICE

AMD2901-4Bit Slice ..... \$7.95  
AMD2903-4 Bit Super Slice  
..... \$12.95  
AMD2911-Sequencer .... \$3.95  
AMD29705-16 Register Files  
..... \$4.95

## TTL

7400 .19 7474 .29  
7402 .19 7486 .29  
7404 .19 74109 .45  
7406 .19 74125 .49  
7408 .19 74154 1.19  
7410 .19 74175 .79  
7438 .22 74367 .59

## 74 LS

LS00 .24 LS123 .99 LS221 1.10  
LS04 .24 LS125 .95 LS240 .99  
LS05 .24 LS138 .79 LS241 .99  
LS10 .24 LS139 .79 LS244 .99  
LS14 .89 LS151 .79 LS245 1.95  
LS20 .24 LS153 .79 LS266 .59  
LS27 .24 LS154 1.75 LS283 .99  
LS30 .24 LS157 .79 LS293 1.75  
LS32 .36 LS161 .99 LS367 .79  
LS74 .44 LS164 .99 LS368 .79  
LS85 .95 LS175 .89 LS373 .99  
LS86 .39 LS181 1.99 LS375 1.19  
LS90 .69 LS193 .89 LS377 1.49  
LS393 1.50

## VOLTAGE REGULATORS

7805 .99 7905 .99  
7812 .99 7912 .99  
7815 .99 7915 .99  
7824 .99 7924 .99

## 74-S

74S04 ..... \$ .39  
74S138 ..... .95  
74S240 ..... 1.99  
74S244 ..... 1.99

\*LM323K-5v-3amp to-3 \$3.95 3/10.00

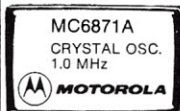
SPECIAL PURCHASE 4116-300n.s..... 8/12.95

# DIGITAL RESEARCH: PARTS

## "TOP QUALITY PARTS FOR LESS"

## Precision Hybrid Oscillator Module

Has both 1 MHZ and 2 MHZ TTL - outputs — Hermetically sealed — Ultra high stability over wide temp. range — originally cost over \$40.00 each — We made a super purchase from a major computer manufacturer — 5 Volt operation - fits standard 24 pin socket - Manufactured by Motorola oscillator division.



MC6871A

3/20<sup>00</sup>

7<sup>50</sup> w/data

## NEO 2137 by NEC

- Microwave R.F. transistor (N.P.N.)
- Micromold package #37
- Dual Emitter leads
- FT to 4.5 GHZ
- VCEO 10V-CC 20 MA. HFE 40-200
- Gain 10V-20MA-1GHZ = 14DB Typical
- Very low noise - High gain 1.5 DB @ 500 MHZ
- Cleared for high reliability space applications

COMPARE

1 50

## LM117

An easy to use adjustable Voltage Regulator - only two external resistors needed to set the output voltage - TO-3 Case - adjustable from 1.2 to 37V - Regulator is floating, so it can be used in a wide variety of applications, as long as the input-to-output differential voltage is 40V or less - 1.5A output current - house numbered - prime - Motorola.



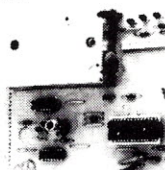
1 75

## Video Game Board

Hockey • Tennis • Handball

- General Instruments AY3-8500
  - Features Exciting Sounds
  - On Screen Scoring
  - 1 or 2 Players
  - Speed & Paddle Controls
  - Works on 9 Volts D.C.
- Each board comes with RF Modulator (Ch. 3 or 4) and schematic. The only parts needed to complete game are speaker, 2-1 Meg Pots & Switches.

4 45  
3 for 12<sup>00</sup>



## Video Paddle Controls

2 for 1<sup>00</sup>

Can be used with game board at left.



SEE WHAT BILLY BOB HAS TO SAY ON PAGE 18 OF OUR NEW CATALOG!

### TERMS:

Add \$1 postage, we pay balance. Orders under \$15 add 75¢ handling. No C.O.D. We accept Visa, MasterCard and American Express cards. Tex. Res. add 5% Tax. Foreign orders (Canada 10%) add 20% P & H.

\* VISA • MASTERCARD • AMERICAN EXPRESS •

## Digital Research: Parts

P.O. Box 401247B • Garland, Texas 75040

(214) 271-2461



# GOODBYE, DISK WAIT... M-DRIVE™ HAS ARRIVED.

**What does M-Drive® do?** Simply stated, M-Drive provides up to a 3500% increase in speed during disk-intensive computing.

**How does M-Drive work?** It uses G and G Engineering's Warp Drive® software to run extended address IEEE 696/S-100 RAM under CP/M® 2.2, so that the memory appears identical to a disk drive. The RAM can be formatted, it has a directory, and it can hold files which may be written, read, copied to or from another disk, or executed. There are no slowly rotating and buzzing disk drives when M-Drive is in use; only the sound of data being transferred at the speed of light.

**Does this obsolete the floppy disk?** Not quite. A floppy disk is still required for system initialization, and for saving finished files. At all other times, however, M-Drive saves you the tedium of going back and forth between computer and disk.

**What are the hardware requirements?** M-Drive is configured for systems that include a 6 MHz CompuPro CPU 8085/88 dual processor, Disk 1 DMA disk controller, and System Support 1.

**How can I upgrade to M-Drive?** Select either the 128K or 256K M-Drive package, then return your CompuPro CP/M disk to the factory for modification. If your CPU 8085/88 runs at 4 MHz, it must also be returned and upgraded to 6 MHz. The costs of these modifications are included in the prices below.

**M-DRIVE: THE FASTEST WAY TO COMPUTE**

128K M-DRIVE with low power, high speed RAM and software: \$1590  
256K M-DRIVE with low power, high speed RAM and software: \$3100

## BIG PRICE REDUCTIONS ON STATIC MEMORY

CompuPro memories are the fastest in the S-100 business, performing effortlessly with 6 MHz Z-80® and 10 MHz 8088/86 processors. But speed isn't all that we offer; consider the low power consumption (again, the lowest in the business), innovative technical design, fully static operation (for flawless DMA), an enviable record for reliability, and the experience we've acquired from over 6 years of making quality S-100 memory. Compare our specifications with the rest...you'll see why systems integrators world-wide choose CompuPro memory for commercial, industrial, and scientific applications. (Note: CSC boards are qualified under the Certified System Component high-reliability program, with 200 hour burn-in and 2 year extended warranty.)

**8K/16K/24K/32K RAM 20 Static Memory Board.** With extended addressing and bank select. **RAM 20-8K:** \$210 A/T, \$280 CSC. **RAM 20-16K:** \$285 A/T, \$355 CSC. **RAM 20-24K:** \$355 A/T, \$425 CSC. **RAM 20-32K:** \$425 A/T, \$495 CSC.

**816 64K RAM 16 Static Memory Board.** "Hermaphrodite" 64K memory runs in 8 bit systems as a 64K X 8 board, or in 16 bit systems as a 32K X 16 board. **RAM 16-64:** \$895 A/T, \$995 CSC.

**48K/64K RAM 17 Static Memory Board.** Exceptionally low power (2W max, 1.6W typ for 64K) board runs faster and cooler than dynamics, while flawlessly handling DMA. **RAM 17-48K:** \$650 A/T, \$750 CSC. **RAM 17-64K:** \$795 A/T, \$895 CSC.

**816 128K RAM 21 Static Memory Board.** Exceptionally low power, high speed static memory. Configure as 128K X 8 or 64K X 16. **RAM 21-128K:** \$1695 A/T, \$1895 CSC.

**How to order:** Call 415-562-0636 for the name of the authorized CompuPro sales center nearest you, or for placing factory direct VISA® /Mastercard® orders. Prices shown do not include tax, shipping, or dealer installation/support charges (if applicable).

\*LEGAL CORNER: M-Drive is a trademark of CompuPro. Warp Drive is a trademark of G and G Engineering.

**CompuPro™**

BOX 2355, OAKLAND AIRPORT, CA 94614

✓ 42  
division

**GODBOUT**  
ELECTRONICS

(415) 562-0636











# WAMECO

## THE COMPLETE PC BOARD HOUSE

### EVERYTHING FOR THE S-100 BUSS

- \* **CPU-2** Z80 PROCESSOR BOARD ON BOARD ROM AND HARDWARE POWER ON JUMP.  
PCBD ..... \$35.95      KIT ..... \$135.95
- \* **MEM-3** 24 ADDRESS LINES EXPANDABLE IN 1K INCR. ADDRESSABLE IN 8K BLOCKS. BIDIRECTIONAL BUSSING.  
PCBD ..... \$ 42.95      KIT LESS RAM ..... \$119.95  
KIT WITH 2114L-4 \$475.95      KIT WITH 2114L-2 \$549.95  
A&T WITH 2114L-4 \$505.95      A&T WITH 2114L-2 \$579.95
- \* **FPB-1A** FRONT PANEL BOARD FOR 8080A AND Z80 SYSTEMS IMSAI COMPATIBLE.  
PCBD ..... \$56.95      KIT ..... \$175.00
- \* **EPM-2** 16/32K ROM USES 2716 OR 2708. ADDRESSABLE IN 4K BOUNDARIES.  
PCBD .... \$33.95      KIT (LESS ROMS) .... \$74.95
- \* **CPU-1** 8080A PROCESSOR BOARD WITH VECTOR INTERRUPT.  
PCBD ..... \$33.95      KIT ..... \$124.95
- \* **QMB-12** 13 SLOT MOTHER BOARD.  
PCBD ..... \$42.95      KIT ..... \$125.95
- \* **QMB-9** 9 SLOT MOTHER BOARD.  
PCBD ..... \$35.95      KIT ..... \$109.95
- \* **PTB-1** POWER SUPPLY AND TERMINATOR BOARD.  
PCBD ..... \$29.95      KIT ..... \$49.95
- \* **RTC-1** REAL TIME CLOCK BOARD WITH TWO INTERRUPTS.  
PCBD ..... \$29.95      KIT ..... \$79.95
- \* **MEM-1A** 8K RAM, USES 2102's.  
PCBD .... \$33.95      KIT (LESS RAM) .... \$71.95
- \* **IOB-1** I/O BOARD. ONE SERIAL, TWO PARALLEL WITH CASSETTE.  
PCBD ..... \$33.95
- \* **FDC-1A** FLOPPY DISC CONTROLLER BOARD USES 1771.  
PCBD ..... \$45.95

FUTURE PRODUCTS: 80 CHARACTER VIDEO BOARD.  
8 PARALLEL PORT I/O BOARD.

DEALER INQUIRIES INVITED, UNIVERSITY DISCOUNTS AVAILABLE  
AT YOUR LOCAL DEALER

**WMC inc.**

WAMECO, INC., P. O. BOX 877 • EL GRANADA, CA 94018 • (415) 728-9114



CALIFORNIA COMPUTER SYSTEMS

#### \$100

- 2032 32K STATIC RAM A & T.
- 450 NSEC. \$579.00, 300 NSEC. \$585.00, 200 NSEC. \$629.00
- 2116 16K STATIC RAM A & T.
- 450 NSEC. \$285.00, 300 NSEC. \$289.00, 200 NSEC. \$329.00
- 2065 64K DYNAMIC RAM A & T. .... \$548.95
- 2200 S-100 MAIN FRAM A & T. .... \$379.95
- 2422 FLOPPY DISC WITH CP/M 2.2" .... \$329.95
- 2802 6502 PROCESSOR A & T. .... \$282.95
- 2810A Z80 CPU A & T. .... \$249.95
- 2710A 4 SERIAL I/O A & T. .... \$291.95
- 2718A 2 SERIAL, 2 PARALLEL A & T. .... \$305.95
- 2720A 4 PARALLEL A & T. .... \$214.95
- PROTO BOARDS WW .... \$39.95, SOLDERTAIL .... \$29.95

#### APPLE PRODUCTS

- 7114A 12K ROM/PROM ..... \$68.50
- 7424A CALENDAR/CLOCK ..... \$106.95
- 7440A PROGRAMMABLE TIMER ..... \$98.50
- 7470A A TO O CONVERTER ..... \$105.95
- 7490A GPIB (IE 488) INTERFACE ..... \$265.95
- 7710A ASYNC SERIAL ..... \$125.95
- 7712A SYNC SERIAL ..... \$153.95
- 7720A PARALLEL STANDARD ..... \$98.95
- 7720B PARALLEL CENTRONICS ..... \$98.95
- 7811B ARITHMETIC PROCESSOR W/DISC ..... \$342.95
- 7811C ARITHMETIC PROCESSOR W/ROM ..... \$342.95
- 7500A WW BOARD ..... \$22.95
- 7510A SOLDERTAIL BOARD ..... \$23.95

#### SOFTWARE

- 2610 CP/M™ MACRO ASSEMBLER ON DISK ..... \$76.95
- 2620 CP/M™ SYMBOLIC INSTRUCTION DEBUGGER ..... \$64.25
- 2630 CP/M™ TEXT FORMATER ..... \$64.25
- 2640 CP/M™ BACKGROUND PRINT UTILITY ..... \$42.95

OTHER CCS PRODUCTS ARE AVAILABLE.  
CALL FOR PRICE.



MICROCOMPUTER PRODUCTS

#### \$100 PRODUCTS

- CB1A 8080 PROCESSOR PCBD ..... \$32.95
- KIT ..... \$155.95, A & T ..... \$215.95
- CB-2 280 PROCESSOR BOARD.
- KIT ..... \$198.95, A & T ..... \$269.95
- VBIC 64 x 16 VIDEO, PCBD ..... \$32.95
- KIT ..... \$153.95, A & T ..... \$199.95
- VB2 64 x 16 VIDEO, PCBD ..... \$32.95
- KIT ..... \$175.95, A & T ..... \$234.95
- VB3 80 CHARACTER VIDEO 4MHZ.
- KIT ..... \$345.95, A & T ..... \$425.95
- UPGRADE RAMS FOR VB-3 ..... \$42.00
- IO4 2 PARALLEL, 2 SERIAL, PCBD ..... \$32.95
- KIT ..... \$155.95, A & T ..... \$194.95
- PB-1 2708, 2716 PROGRAMMER BOARD.
- KIT ..... \$135.95, A & T ..... \$185.95
- MB-10 16K STATIC RAM.
- KIT ..... \$299.95, A & T ..... \$339.95

#### APPLE PRODUCTS

- A488 IEEE 488 INTERFACE ..... \$399.95
- A10 SERIAL/PARALLEL INTERFACE.
- KIT ..... \$125.95, A & T ..... \$155.95
- AS10 SERIAL I/O
- KIT ..... \$87.95, A & T ..... \$97.95
- API0 PARALLEL 10
- KIT (W/O CABLES) ..... \$67.95, A & T (W/O CABLES) ..... \$87.95

OTHER SSM PRODUCTS ARE AVAILABLE.  
CALL FOR PRICES.

**MIKOS**

MONDAY-FRIDAY, 8:00 TO 12:00, 1:00 TO 5:30  
THURSDAYS, 8:00 TO 9:00 P.M.

(415) 728-9121

P.O. BOX 955 • EL GRANADA, CA 94018  
PLEASE SEND FOR IC, XISTOR AND COMPUTER PARTS LIST

#### NOV. SPECIAL SALE ON PREPAID ORDERS

(CHARGE CARDS AND C.O.D. OR P.O. NOT AVAILABLE ON THESE OFFERS)

10% OFF ON WAMECO PCBD'S WITH MIKOS PARTS

**WMC inc.** WAMECO INC.  
BOARDS WITH MIKOS PARTS

- MEM-3 32K STATIC RAM, PCBD ..... \$36.95
- KIT LESS RAM ..... \$95.95, A & T ..... \$135.95
- CPU-2 Z80 PROCESSOR, PCBD ..... \$32.95
- KIT LESS ROM ..... \$109.95, A & T ..... \$149.95
- EPM-2 16K/32K EPROM, PCBD ..... \$32.95
- KIT LESS ROM ..... \$65.95, A & T ..... \$99.95
- FPB-1 FRONT PANEL, PCBD ..... \$48.50
- KIT ..... \$144.95, A & T ..... \$184.95
- CPU-1 8080 PROCESSOR, PCBD ..... \$29.95
- KIT ..... \$89.95, A & T ..... \$129.95
- QMB-12 13 SLOT MOTHER BOARD, PCBD ..... \$39.95
- KIT ..... \$95.95, A & T ..... \$135.95

OTHER WAMECO PRODUCTS ARE AVAILABLE.  
CALL FOR PRICES.

MIKOS PARTS ASSORTMENTS ARE ALL FACTORY MARKED PARTS. KITS INCLUDE ALL PARTS LISTED AS REQUIRED FOR THE COMPLETE KIT LESS PARTS LISTED. ALL SOCKETS INCLUDED

LARGE SELECTION OF LS TTL AVAILABLE.  
PURCHASE \$50.00 WORTH OF LS TTL AND GET 10% CREDIT TOWARD ADDITIONAL PURCHASES. PREPAID ORDERS ONLY.

VISA or MASTERCHARGE Send account number, interbank number, expiration date and sign your order. Approx. postage will be added. Check or money order will be sent post paid in U.S. If you are not a regular customer, please use charge, cashier's check or postal money order. Otherwise there will be a two-week delay for checks to clear. Calif. residents add 6% tax. Money back 30-day guarantee. We cannot accept returned IC's that have been soldered to. Prices subject to change without notice. \$10 minimum order. \$1.50 service charge on orders less than \$10.00.



**RCA Cosmac 1802 Super Elf Computer \$106.95**

plus **load, reset, run, wait, input, memory protect, monitor select and single step**. Large, on-board displays provide output and optional **high and low address**. There is a 44 pin standard connector slot for PC cards and a 50 pin connector slot for the Quest Super Expansion Board. Power supply and sockets for **all IC's** are included in the price plus a detailed 127 pg. instruction manual which now includes over 40 pgs. of software info, including a series of lessons to help get you started and a music program and graphics target game. Many schools and universities are using the Super Elf as a course of study. OEM's use it for training and R&D.

Remember, other computers only offer Super Elf features at additional cost or not at all. **Compare before you buy. Super Elf Kit \$106.95, High address option \$8.95, Low address option \$9.95. Custom Cabinet with drilled and labelled plexiglass front panel \$24.95.** All metal Expansion Cabinet, painted and silk screened, with room for 5 S-100 boards and power supply **\$57.00. NiCad Battery Memory Saver Kit \$6.95.** All kits and options also completely assembled and tested.

**Questdata**, a software publication for 1802 computer users is available by subscription for \$12.00 per 12 issues. Single issues \$1.50. Issues 1-12 bound \$16.50.

**Free 14 page brochure.**  
of complete Super Elf system.

**Moews Video Graphics \$3.50. Games and Music \$3.00, Chip 8 Interpreter \$5.50.**

points can be used with the register save feature to isolate program bugs quickly, then follow with single step. If you have the **Super Expansion Board** and **Super Monitor** the monitor is up and running at the push of a button.

Other on board options include **Parallel Input and Output Ports** with full handshake. They allow easy connection of an ASCII keyboard to the input port. **RS 232 and 20 ma Current Loop** for

teletype or other device are on board and if you need more memory there are two **S-100** slots for static RAM or video boards. Also a 1K Super Monitor version 2 with video driver for full capability display with Tiny Basic and a video interface board. **Parallel I/O Ports \$9.85, RS 232 \$4.50, TTY 20 ma 1/I \$1.95, S-100 \$4.50.** A 50 pin connector set with ribbon cable is available at \$15.25 for easy connection between the **Super III** and the **Super Expansion Board**.

**Power Supply Kit** for the complete system (see Multi-volt Power Supply).

New improved faster version including **re-number** and essentially **unlimited variables**. Also, an exclusive user expandable command library.

Serial and Parallel I/O included.

**Super Basic on Cassette \$55.00.**

**Elf II Adapter Kit \$24.95**

**Elf II Adapter Kit \$24.95**  
Plugs into Elf II providing Super Elf 44 and 50 pin plus S-100 bus expansion. (With Super Expansion). High and low address displays, state and mode LED's optional **\$18.00.**

0-1-0-100 M.L. - Kit 0-100 05

**Super Color S-100 Video Kit \$129.95**  
Expandable to 256 x 192 high resolution color graphics. 6847 with all display modes computer controlled. Memory mapped. 1K RAM expandable.

**Dealers: Send for excellent pricing/margin**

Editor Assembler	\$25.00
(Requires minimum of 4K for E/A plus user source)	
1802 Tiny Basic Source listing	\$19.00
Super Monitor V2 0/2 1 Source Listing	\$20.00

**PROM Eraser**  
assembled. 25 PROM capacity **\$37.50**  
(with timer **\$69.50**). 6 PROM capacity QSHA/  
III version **\$78.50** (with timer **\$108.50**)

16 bit I/O, 2 MHz clock, 2K RAM, ROM Bread-board space. Excellent for control. Bare Board **\$28.50**. Full Kit **\$99.00**. Monitor **\$20.00**. Power Supply Kit **\$35.00**. Tiny Basic **\$30.00**

8K Static Godbout Econo IIA Kit	149.00
16K Static Godbout Econo XIV Kit	269.00
24K Static Godbout Econo XX-24 Kit	414.00
32K Static Godbout Econo XX-32 Kit	537.00
16K Dynamic RAM Kit	289.00
32K Dynamic RAM Kit	328.00
64K Dynamic RAM Kit	399.00
Video Interface Kit	<b>\$161.00</b>
Color Video Kit	129.95

Comp. IC data selector, 2 vol. master reference guide. Over 51,000 cross references. Free update service through 1981. Domestic postage \$4.75.

**Modem Kit \$60.00**  
State of the art, orig., answer. No tuning necessary. 103 compatible 300 baud. Inexpensive acoustic coupler plans included. Bd. Only \$17.00. Article in June *Radio Electronics*.

32 x 16 alpha/numerics and graphics; up to 8 colors with 6847 chip; 1K RAM at E000. Plugs into Super Elf 44 pin bus. No high res. graphics. On board RF Modulator Kit **\$4.95**

**NiCad Battery Fixer/Charger Kit**  
Opens shorted cells that won't hold a charge and then charges them up, all in one kit w/fu-  
nests and instructions. **\$9.95**

**\$405.00.** 4K version **\$450.00.** 4K Assembler **\$85.00.** 8K Basic Interpreter **\$100.00.**

Special small power supply for AIM65 assem. in frame **\$54.00**. Complete AIM65 in thin briefcase with power supply **\$499.00**. Molded plastic enclosure to fit both AIM65 and power supply **\$47.50**. Special Package Price: 4K AIM, 8K Basic, power supply, cabinet **\$625.00**.

AIM65/KIM/VIM/Super Elf 44 pin expansion board; 3 female and 1 male bus. Board plus 3 connectors **\$22.95**.

**Converts digital clocks from AC line frequency to crystal time base. Outstanding accuracy.**

**Video Modulator Kit** **\$9.95**  
Convert TV set into a high quality monitor w/o affecting usage. Comp. kit w/full instruc.

8v 5 amp,  $\pm 18v$  .5 amp, 5v 1.5 amp, -5v  
.5 amp, 12v .5 amp, -12v option.  $\pm 5v$ ,  $\pm 12v$

of hardware **\$16.00**. Woodgrain case **\$10.00**. \$1.50 shipping.

Master Charge accepted. \$1.00 insurance

---



## COMPONENTS

SN7400N	18	SN7482N	30
SN7402N	22	SN7402N	49
SN7404N	21	SN7403N	45
SN7408N	22	SN7405N	50
SN7410N	18	SN7406N	50
SN7412N	20	SN74122N	39
SN7413N	22	SN74136N	95
SN7414N	29	SN74141N	69
SN7415N	27	SN74151N	65
SN7417N	29	SN74153N	55
SN7420N	17	SN74154N	125
SN7422N	20	SN74155N	75
SN7430N	17	SN74157N	58
SN7437N	26	SN74160N	89
SN7438N	24	SN74161N	85
SN7440N	18	SN74163N	85
SN7442N	45	SN74164N	87
SN7443N	42	SN74165N	55
SN7445N	64	SN74174N	88
SN7451N	19	SN74175N	79
SN7454N	19	SN74180N	75
SN7474N	27	SN74181N	115
SN7475N	35	SN74393N	165

## 74LS00

74LS00	28	74LS158	69
74LS02	28	74LS161	83
74LS03	28	74LS162	89
74LS04	28	74LS163	96
74LS05	22	74LS164	65
74LS08	29	74LS165	55
74LS09	28	74LS169	75
74LS10	26	74LS170	175
74LS14	89	74LS174	85
74LS20	22	74LS175	85
74LS21	26	74LS190	85
74LS26	40	74LS191	125
74LS27	27	74LS195	95
74LS28	37	74LS197	75
74LS30	29	74LS221	125
74LS32	31	74LS240	155
74LS38	31	74LS241	155
74LS42	63	74LS243	155
74LS48	77	74LS244	155
74LS74	38	74LS245	245
74LS75	55	74LS251	125
74LS86	45	74LS253	85
74LS90	59	74LS257	85
74LS93	65	74LS259	195
74LS96	80	74LS260	55
74LS107	43	74LS273	155
74LS113	45	74LS279	45
74LS122	45	74LS290	125
74LS123	89	74LS293	185
74LS125	89	74LS385	145
74LS126	79	74LS367	75
74LS138	64	74LS373	145
74LS139	59	74LS374	145
74LS151	49	74LS377	125
74LS153	49	74LS366	155
74LS157	69	74LS370	185

## 74 S00

74S00	39	74S138	75
74S02	45	74S140	100
74S03	38	74S158	75
74S04	39	74S174	135
74S05	39	74S175	135
74S10	39	74S182	75
74S15	45	74S189	4.25
74S20	55	74S201	6.75
74S22	55	74S240	2.75
74S30	75	74S240	2.95
74S37	55	74S251	2.75
74S50	65	74S287	2.95
74S51	49	74S289	2.95
74S64	55	74S299	5.75
74S74	65	74S470	9.25
74S86	95	74S471	9.50
74S112	1.95	74S472	9.50
74S132	1.45	74S474	9.50

## EPROMS

2708	3.25ea	8 for 2.95ea
2716	5.50ea	8 for 5.00ea
2732	12.95ea	4 for 11.00ea
4116	300NS 2.00ea 8 for 14.00	
	200NS 2.35ea 8 for 16.00	

214L	300NS 2.25ea 4 for 1.90ea	
	200NS 2.45ea 4 for 2.00ea	
2111	450NS 2.50ea 10 for 2.00ea	

## MISC.

2102	450NS	95	cont'd
8038	2.95	1103A	75
NE555	27	UP0765	19.85
AY5-1013A	4.25	floppy disk	w/ tape
1488	95	controller	1.40
1489	95	ULN2001	1.40
8728	1.30	TMS4400	1.40
8728	1.30	MC4008P	1.50
8212	1.95	MH0026	1.55
8216	1.95	C0324	1.95
IS40KCR	85	D3001	1.95
IT40TRIAC	85	D3002	1.95
7905	85		
7908	85		
7915	85		
7918	85		
7905	85		
7906	85		
7908	85		
7912	85		
MC1330AIP	1.60	10/5/30	14 10/120
MC1350P	1.15	10/5/70	16 10/140
MC1358P	1.50	10/8/70	18 10/180
LM390	1.10	10/9/70	20 10/270
LM555N	95	10/12/70	22 10/270
LM741	25	10/13/70	24 10/270
MC1458P	95	10/14/70	28 10/300
LM750	30	10/17/70	40 10/390
LM398	1.30	wirewrap	solder

Z-80	CPU's	7.95
Z-80A CTC		10.50
Z-80A CPU		10.50
Z-80 002 16-64K		128.00
8085A		13.50
2901A		7.50
MC6800		9.50

## BEST SELLERS

1981 IC MASTER	59.95
Sybox: "MICROPROCESSORS"	12.95
Osborne: "APPLE II USER'S GUIDE"	15.95

## SPECIALS

ZENITH ZVM-121  
Video Monitor / Green !!

12 inch  
15 MHz ☆  
**\$139.00**

8255	→ \$7.95
8748-8	→ \$31.00
3341PC	→ \$2.00
MM5060	→ 35¢
MC6800	→ \$7.75
MC6802	→ \$14.95
MC6850	→ \$4.50
MC6821	→ \$4.95

## CARDS

MICROSOFT:	
Z80	\$29500
16K RAM	\$16000
VIDEX:	
VIDEOTERM	\$29500
80 column	

KEYBOARD ENHANCER	\$12000
CALIF. COMP. SYS:	
APPLE	
CLOCK	\$12400
PROTO BOARD	\$2500

## PRINTERS

EPSON:	
MX-80	
ST: ☆	\$53500
FT: ☆	\$64500

INTERFACE CARD/CABLE	\$78.50
----------------------	---------

## SPECIALS

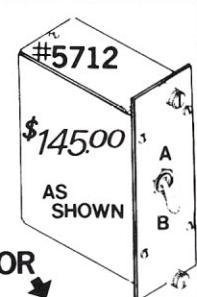
3inch. COMPUTER FANS w/cord	→ \$9.95
2111-256x4 Static RAM	→ \$1.75
8155 → RAM, 1/0, Timer	→ \$11.50
ER2051 → EROM	→ \$4.95
8085A → CPU	→ \$8.50
MC6800 → CPU	→ \$7.75
UPD 765A → Floppy Disk Controller	→ \$19.95
2732A → 250ns EPROM	→ \$15.50
AY5 1013A → 30K Band UART	→ \$2.95
93419 → 64x9 Static RAM	→ \$5.50
2901A → 4-Bit Slice	→ \$7.50

4inch FAN  
"Whisper"  
w/cord  
**\$8.95**

## REAL-TIME CLOCK CALENDAR (MSM 5832)

Description: Mono. Metal Gate CMOS I.C.

Features	
Time, Month, Date, Year, & Day of Week	
• Bus Oriented	
• 4 Bit Data Bus	\$7.45
• 4 Bit Address	W/SPEC's
• R/W Hold Selec. +	
• Inter. Signal	XTAL
• 32.768Khz. xtal Control.	\$2.85
• 5v Pow. Sup.	
• Low Power Dissipation	



OR  
SHELF / DESK MOUNTED #5722

\$15500  
DESC.  
RS-232 COMPATIBLE DIGITAL TRANSFER SWITCH WILL SWITCH MODEMS BETWEEN PROCESSORS / PRINTERS. 24 PINS ARE SWITCHED. PIN 1 WIRED TO GROUND.

T-bar INCORPORATED

## CONCORD COMPUTER PRODUCTS

1971 SO. STATE COLLEGE ANAHEIM, CALIF. 92806  
(714) 937-0637  
VISA CHECK M/O NO COD  
\$10. MIN ORDER / CA. RES. ADD 6% FRT.  
10-49 \$2.00 50-99 \$3.00 100-240 \$8.00 250-499 \$9.00 500-999 \$10.00 1000-UP CALL  
☆ send \$100 for "81" catalog ☆

## COMPUTERS

## ATARI® 800™ COMPUTER SYSTEM



400 Computer 8K → \$350.00  
800 Computer 16K → \$759.00  
\*800 COMPUTER w/48K → **\$898.00**

\*Best Buy

## ATARI PERIPHERALS:

Printer ("825")	\$775.00	Printer ("822")	\$379.00
Recorder	\$65.00	Disk Drive	\$565.00
Interface ("850")	\$175.00	Modem	\$169.00
Paddles	\$17.00	Joysticks	\$17.00
Star Raiders	\$49.00	Assembler Editor	\$49.00
Space Invaders	\$17.00	Music Composer	\$49.00
Chess	\$32.00	Mailing List	\$17.00
Kingdom	\$12.00	TV Switch Box	\$8.95
Hangman	\$12.00	16K RAM	\$155.00
Blackjack	\$12.00	8K RAM	\$119.00

## NEW ATARI SOFTWARE

MISSILE COMMAND	→ \$36.00
ASTEROIDS	→ \$36.00
VIDEO EASEL	→ \$32.00
3-D TIC-TAC-TOE	→ \$32.00
"APPLE II Plus"	



48k → \$1199.00  
64k → \$1399.00

## MONITORS

video 100	\$12900	video 100	\$15500	video 100	\$365.00
12 inch 12MHz BLACK & WHITE VIDEO MONITOR		12 inch 12MHz "AMDEK" GREEN PHOS VIDEO MONITOR		COLOR II	
AMDEK (LEEDER) Corp.					

## TERMINALS



Synertek "KTM-3"

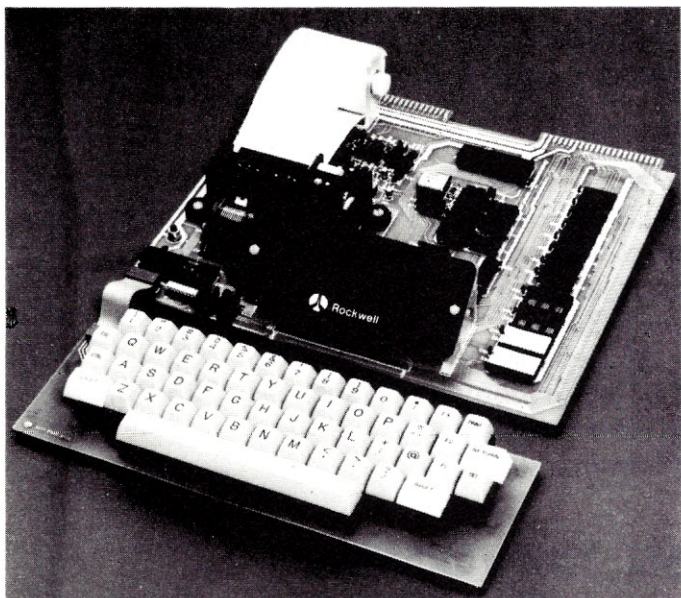


LOW COST TERMINAL WITH KEYBOARD AND VIDEO 100  
★ \$499.00

\$689.00



# AIM 65 BY ROCKWELL INTERNATIONAL



AIM 65 is fully assembled, tested and warranted. With the addition of a low cost, readily available power supply, it's ready to start working for you.

AIM 65 features on-board thermal printer and alphanumeric display, and a terminal-style keyboard. It has an addressing capability up to 65K bytes, and comes with a user-dedicated 1K or 4K RAM. Two installed 4K ROMs hold a powerful Advanced Interface Monitor program, and three spare sockets are included to expand on-board ROM or PROM up to 20K bytes.

An Application Connector provides for attaching a TTY and one or two audio cassette recorders, and gives external access to the user-dedicated general purpose I/O lines.

Also included as standard are a comprehensive AIM 65 User's Manual, a handy pocket reference card, an R6500 Hardware Manual, an R6500 Programming Manual and an AIM 65 schematic.

AIM 65 is packaged on two compact modules. The circuit module is 12 inches wide and 10 inches long, the keyboard module is 12 inches wide and 4 inches long. They are connected by a detachable cable.

## THERMAL PRINTER

Most desired feature on low-cost microcomputer systems . . .

- Wide 20-column printout
- Versatile 5 x 7 dot matrix format
- Complete 64-character ASCII alphanumeric format
- Fast 120 lines per minute
- Quite thermal operation
- Proven reliability

## FULL-SIZE ALPHANUMERIC KEYBOARD

Provides compatibility with system terminals . . .

- Standard 54 key, terminal-style layout
- 26 alphabetic characters
- 10 numeric characters
- 22 special characters
- 9 control functions
- 3 user-defined functions

## TRUE ALPHANUMERIC DISPLAY

Provides legible and lengthy display . . .

- 20 characters wide
- 16-segment characters
- High contrast monolithic characters
- Complete 64-character ASCII alphanumeric format

## PROVEN R6500 MICROCOMPUTER SYSTEM DEVICES

Reliable, high performance NMOS technology . . .

- R6502 Central Processing Unit (CPU), operating at 1 MHz. Has 65K address capability, 13 addressing modes and true index capability. Simple but powerful 56 instructions.
- Read/Write Memory, using R2114 Static RAM devices. Available in 1K byte and 4K byte versions.
- 8K Monitor Program Memory, using R2332 Static ROM devices. Has sockets to accept additional 2332 ROM or 2532 PROM devices, to expand on-board Program memory up to 20K bytes.
- R6532 RAM-Input/Output-Timer (RIOT) combination device. Multipurpose circuit for AIM 65 Monitor functions.
- Two R6522 Versatile Interface Adapter (VIA) devices, which support AIM 65 and user functions. Each VIA has two parallel and one serial 8-bit, bidirectional I/O ports, two 2-bit peripheral handshake control lines and two fully-programmable 16-bit interval timer/event counters.

## BUILT-IN EXPANSION CAPABILITY

- 44-Pin Application Connector for peripheral add-ons
- 44-Pin Expansion Connector has full system bus
- Both connectors are KIM-1 compatible

## TTY AND AUDIO CASSETTE INTERFACES

Standard interface to low-cost peripherals . . .

- 20 ma. current loop TTY interface
- Interface for two audio cassette recorders
- Two audio cassette formats: ASCII KIM-1 compatible and binary, blocked file assembler compatible

## ROM RESIDENT ADVANCED INTERACTIVE MONITOR

Advanced features found only on larger systems . . .

- Monitor-generated prompts
- Single keystroke commands
- Address independent data entry
- Debug aids
- Error messages
- Option and user interface linkage

## ADVANCED INTERACTIVE MONITOR COMMANDS

- Major Function Entry
- Instruction Entry and Disassembly
- Display/Alter Registers and Memory
- Manipulate Breakpoints
- Control Instruction/Trace
- Control Peripheral Devices
- Call User-Defined Functions
- Comprehensive Text Editor

## LOW COST PLUG-IN ROM OPTIONS

- 4K Assembler—symbolic, two-pass , A65-010 \$79.00
- 8K BASIC Interpreter A65-020 \$99.00

## POWER SUPPLY SPECIFICATIONS

- +5 VDC  $\pm$  5% regulated @ 2.0 amps (max)
- +24 VDC  $\pm$  15% unregulated @ 2.5 amps (peak)  
0.5 amps average

**PRICE: \$389.00 (1K RAM) \$439.00 (4K RAM)**

**Plus \$4.00 UPS** (shipped in U.S. must give **street** address), \$10 parcel post to APO's, FPO's, Alaska, Hawaii, Canada, \$25 air mail to all other countries

**AIM 65 USER MANUAL \$5.00 plus \$1.50 shipping & handling.**

We manufacture a complete line of high quality expansion boards. Use reader service card to be added to our mailing list, or U.S. residents send \$1.00 (International send \$3.00 U.S.) for airmail delivery of our complete catalog.

**We've Expanded Again!**

**Note our new address.**

4030 N. 27th Avenue, Suite D  
Phoenix, Az 85017  
(602) 265-7564

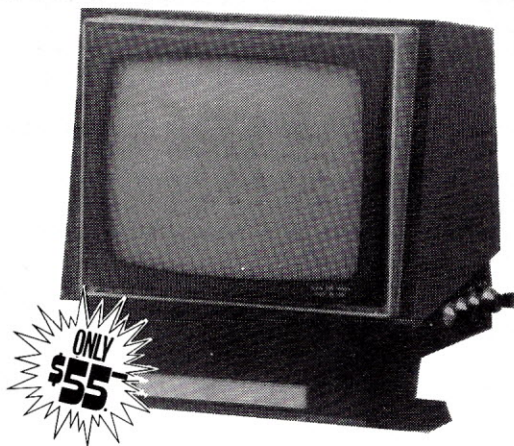
**RNB ENTERPRISES**  
INCORPORATED





# SELECTRONICS

Does it again . . . high quality Sylvania monitors at the lowest prices ever. These monitors have been thoroughly checked and guaranteed.



## MONITORS

12" black & white monitor. Wide band, will display 80 x 24 char. 10K or 75Ω input impedance, composite video input. Transformer power supply.

Shpt. Wt. 30#

Price: \$55 ea.

Used with all computers such as: TRS-80, Apple, and many others.

Complete manual \$5.00.

## PERKIN-ELMER CAROUSEL 350 TERMINAL

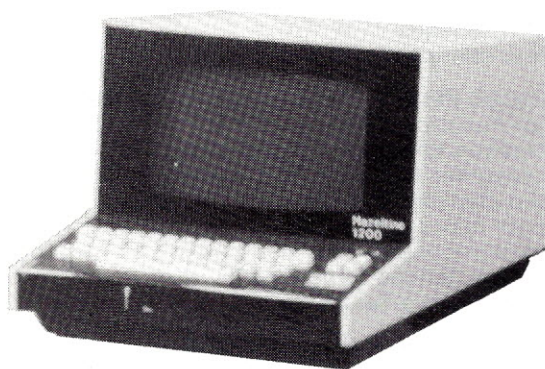
Only Selectronics could bring you this unbelievable opportunity to own the finest high-quality KSR terminal ever made. These machines originally listed for more than \$4200. Check these outstanding features:

- \* Letter quality printing with upper and lowercase
- \* Microprocessor controlled
- \* 76-key alphanumeric keyboard with 10-key numeric pad
- \* EIA RS232C asynchronous serial interface
- \* 40 cps print rate
- \* 132 character buffer



- \* Full or half duplex
- \* Parity—odd, even, none
- \* Replacable print cups and elements

**Excellent Condition—\$750.00 F.O.B. our warehouse.**  
Shpt. Wt. 90#



## HAZELTINE 1200 TERMINALS

24 x 80 character display; 5x7 dot matrix, Raster Scan, full ASCII keyboard; dc to 9600 baud, RS-232C interface; odd, even or no parity; full duplex, MOS-shift register memory with constant refresh.

**ONLY \$200.00**

### Also HAZELTINE 1000's

12 x 80 character baud rate 300

Shpt. Wt. 45#

FOB our warehouse

**ONLY \$150.00**

### ACOUSTIC COUPLE MODEM

Originate by 300 baud, full duplex  
Shpt. Wt. 10#  
**ONLY \$49.00**

### COMPUTER CARBONLESS PAPER

14-7/8 x 11, one-part. 3000 sheets per carton.  
\$24.00 per carton, 5 for \$100.00  
FOB Phila., Pa.  
Shipping Weight 35 lbs.

### DIGITAL DISPLAY BOARDS

6 digit numeric display boards with 6 FND 507. Common anode displays and 10 red LED's. With drivers & logic for multiplexed operation. Price: \$5.00 ea. or 6/\$25.00.

**All items have been thoroughly checked and are in excellent working condition.**

- Test Equipment
- Power Supply Components
- Power Supplies
- Communication Equipment
- Pulse Equipment

✓ 205

# SELECTRONICS

**1206 S. Napa Street • Philadelphia PA 19146**

Penna. resident please add 6% sales tax. **ALL PRICES ARE F.O.B. our warehouse, Phila. PA.** All merchandise accurate as to description to the best of our knowledge. Your purchase money refunded if not satisfied. Min. order \$10.00.

**Phone:**  
215-468-4645  
215-468-7891



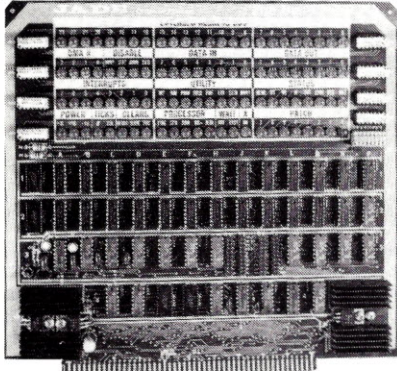
Here we grow again !!!

# Grand Opening Sale

We're celebrating the latest addition to Jade's Retail Division - our new store located in Woodland Hills at 21800 Ventura Blvd.

## New from Jade The Bus Probe

Inexpensive S-100 Diagnostic Analyzer



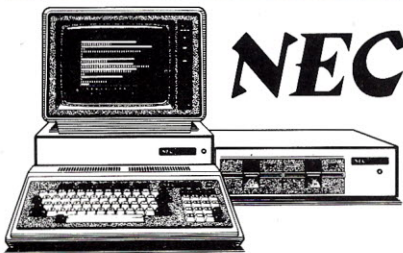
So your computer is down. And you don't have an oscilloscope. And you don't have a front panel... You're not alone - most computers have their occasional bad days. But without diagnostic equipment such as an oscilloscope (expensive!) or a front panel (expensive!), it can be very difficult to pinpoint the problem. Even if you have an extender board with a superfast logic probe, you can't see more than one signal at a time. You're stuck, right?

Not anymore; Jade is proud to offer our cost-effective solution to the problems mentioned above: **THE BUS PROBE**.

Whether you're a hobbyist with a cantankerous kluge or a field technician with an anxious computer owner breathing down your neck, you'll find THE BUS PROBE speeds your repair time remarkably. Just plug in THE BUS PROBE and you'll be able to see all the IEEE S-100 signals in action. THE BUS PROBE allows you to see inputs, outputs, memory reads and writes, instruction fetches, DMA channels, vectored interrupts, 8 or 16 bit wide data transfers, plus the three bus supply voltages.

An on-board pulse generator can provide repetitive resets, interrupts, or wait states, for trouble shooting.

TSX-200B Bare board ..... \$59.95  
TSX-200K Kit ..... \$119.95  
TSX-200A A&T ..... \$149.95



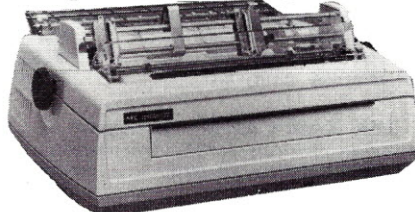
# NEC

4 MHz Z-80 CPU, 80 x 25 display with graphics and 8 colors, 32K RAM, 24K ROM, parallel/serial/cassette interfaces, upper/lower case, numeric keypad, 10 special function keys, uses CP/M 2.2.

NEC-8001A 32K CPU/keyboard .. \$1095.00  
NEC-8012A I/O with 32K RAM ... \$695.00  
NEC-8031A Dual disk unit ..... \$1095.00  
VDM-651200 12" green CRT ..... \$269.95  
NEC-1202D Hi-res RGB color CRT \$1045.00  
VDC-651212 12" color monitor .... \$479.95  
NEC-9010S CP/M 2.2 for NEC .... \$150.00  
NEC-90005 Gen. acting softwre ... \$375.00

## Intersell Sellum I

NEC Spinwriter w/ Intelligent Controller



Standard serial, Centronics parallel, and current loop interfaces • Selectable baud rates 50 to 19,200 • Automatic bidirectional printing • Logic seeking • 650 character buffer with optional 16K buffer • 55 characters per second print speed • Comes with vertical forms tractor, ribbon, thimble and cable • Diablo compatible software • Available with or without optional front panel

PRD-55511 1K no front panel .... \$2795.00  
PRD-55512 16K no front panel ... \$2895.00  
PRD-55515 1K w/front panel ..... \$2995.00  
PRD-55516 16K w/front panel ... \$3095.00

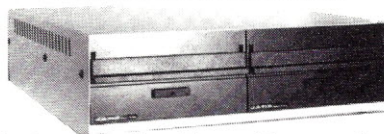
### Intersell NEC 3500Q

Intersell has announced that, available in September, they will offer a version of the new NEC Model 3500Q Spinwriter (30 cps) that will bring to the customer the same standard features as the Sellum I (except the tractor assembly which is optional on the 3500Q) but incorporating the added features of the NEC Model 3500Q

PRD-55351 3500Q 1K ..... \$1995.00  
PRD-55352 3500Q 16K ..... \$2095.00  
PRA-55100 Deluxe tractor option .. \$300.00

## JADE Disk Sub-Systems

Shugart, Siemens, Qume



Handsome metal cabinet with proportionally balanced air flow system • Rugged dual drive power supply • Power cable kit • Power switch, line cord, fuse holder, cooling fan • Never-Mar rubber feet • All necessary hardware to mount 2-8" disk drives, power supply, and fan • Does not include signal cable

### Dual 8" Subassembly Cabinet

END-000420 Bare cabinet ..... \$59.95  
END-000421 Cabinet kit ..... \$225.00  
END-000431 A & T ..... \$359.95

### 8" Disk Drive Subsystems

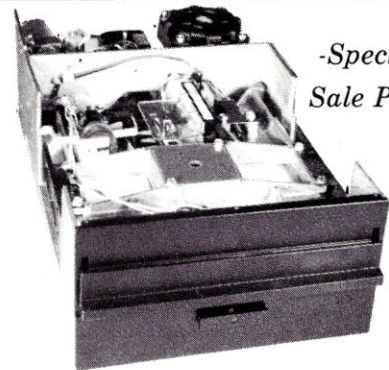
#### Single Sided, Double Density

END-000423 Kit w/2 FD100-8Ds .. \$924.95  
END-000424 A & T w/2 FD100-8Ds \$1124.95  
END-000433 Kit w/2 SA-801Rs ... \$999.95  
END-000434 A & T w/2 SA-801Rs \$1195.00

### 8" Disk Drive Subsystems

#### Double Sided, Double Density

END-000426 Kit w/2 DT-8s ..... \$1224.95  
END-000427 A & T w/2 DT-8s ... \$1424.95  
END-000436 Kit w/2 SA-851Rs .. \$1495.00  
END-000437 A & T w/2 SA-851Rs \$1695.00



-Special  
Sale Price-

## QUME DT-8

8" Double-Sided, Double-Density Disk Drive

1 Drive ... \$524.95 each  
2 Drives . \$499.95 each  
10 Drives \$479.95 each

Jade Part Number MSF-750080

## SIEMENS 8"

8" Single-Sided, Double-Density Disk Drive

1 Drive ... \$384.95 each  
2 Drives . \$349.95 each  
10 Drives \$324.95 each

Jade Part Number MSF-201120

## Shugart 801R

8" Single-Sided, Double-Density Disk Drive

1 Drive ... \$394.95 each  
2 Drives . \$389.95 each

Jade Part Number MSF-10801R

## MPI B-51

5 1/4" Single-Sided, Double-Density Disk Drive

1 Drive ... \$234.95 each  
2 Drives . \$224.95 each  
10 Drives \$219.95 each

Jade Part Number MSM-155100

END-000213 Case & power supply ..... \$74.95

### Micro-Sci

## Apple Disk Drives

Increased Capacity - Decreased Price

40 or 70 track drives • operates with DOS 3.2 and 3.3, Language System, and the Z80 Softcard • 40 and 70 track drives may be mixed on your Apple II • With two 40 track drives you get a 12.5% increase in capacity, 300% improvement in track-to-track access, and save about 15% • With two 70 track drives instead of four 35 track drives you get the same capacity, 300% improvement in track-to-track access time, and save about 45%.

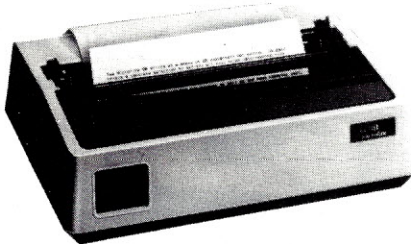
IOD-2340A A-40 with cable ..... \$399.95  
IOD-2370A A-70 with cable ..... \$529.95  
IOD-2300A Micro-sci controller .... \$89.95



# Grand Opening Sale

\*\*\*\*\* San Diego \*\*\*\*\* Hawthorne \*\*\*\*\* Woodland Hills \*\*\*\*\*

## Printers



### BETTER THAN EPSON! - Okidata

**Microline 82A** 80/132 column, 120 CPS, 9 x 9 dot matrix, friction feed, pin feed, adjustable tractor feed (removable), handles 4 part forms up to 9.5" wide, rear & bottom feed, paper tear bar, 100% duty cycle/200,000,000 character print head, bi-directional/logic seeking, both serial & parallel interfaces included, front panel switch & program control of 10 different form lengths, uses inexpensive spool type ribbons, double width & condensed characters, true lower case descenders & graphics  
**PRM-43082 with FREE tractor** .... \$544.95

**Microline 83A** 132/232 column, 120 CPS, handles forms up to 15" wide, plus all the features of the 82A.  
**PRM-43083 with FREE tractor** .... \$774.95  
**PRA-27081A Apple card** ..... \$39.95  
**PRA-27082A Apple cable** ..... \$19.95  
**PRA-27087A TRS-80 cable** ..... \$24.95  
**PRA-43080 Extra ribbons pkg. of 2** ... \$9.95

### INEXPENSIVE PRINTERS - Epson

**MX-70** 80 column, 80 CPS, 5 x 7 dot matrix, adjustable tractor feed, & graphics  
**PRM-27070 List \$459** ..... \$399.95

**MX-80** 80 column, 80 CPS, bi-directional/logic seeking printing, 9 x 9 dot matrix, adjustable tractor feed, & 64 graphics characters  
**PRM-27080 List \$645** ..... \$474.95

**MX-80FT** same as MX-80 with friction feed added.  
**PRM-27082 List \$745** ..... \$574.95

**MX-100** 132 column, correspondence quality, graphics, up to 15" paper, friction feed & adjustable tractor feed, 9 x 9 dot matrix, 80 CPS.  
**PRM-27100 List \$945** ..... \$795.00

**PRA-27084 Serial interface** ..... \$69.95  
**PRA-27088 Serial intf & 2K buffer** .. \$144.95  
**PRA-27081 Apple card** ..... \$74.95  
**PRA-27082 Apple cable** ..... \$22.95  
**PRA-27086 IEEE 488 card** ..... \$52.95  
**PRA-27087 TRS-80 cable** ..... \$32.95  
**PRA-27085 Grafrax II** ..... \$95.00  
**PRA-27083 Extra ribbon** ..... \$14.95

### Dual-Mode 200 - Malibu

200 CPS/9 x 9 matrix or 70 CPS/19 x 18 matrix for letter quality, stores up to 12 different fonts, hi-res dot graphics, single sheet and tractor feed, RS-232C and parallel interfaces  
**PRM-35200 Dual-Mode 200** ..... \$2695.00

## 16K Atari ... \$359.95

### ATARI 800 - Atari

Complete personal computer with high resolution color graphics, built-in RF modulator, 4 controller ports, internal speaker, 16K RAM & 8K ROM  
**SYO-2080A 16K Atari 800** ..... \$759.95  
**Atari 800 with 32K of RAM** ..... \$799.95  
**Atari 800 with 48K of RAM** ..... \$849.95  
**SYO-2040A 16K Atari 400** ..... \$359.95  
**MSM-330810 Disk drive** ..... \$595.00  
**MSM-330815 Dual drive** ..... \$1395.00  
**IOX-5050A 850 interface** ..... \$199.95  
**MEX-16853K 16K RAM module** ..... \$69.95  
**SFI-241011005 Visicalc** ..... \$184.95

## Accessories for Apple

### 16K MEMORY UPGRADE

Add 16K of RAM to your TRS-80, Apple, or Exidy in just minutes. We've sold thousands of these 16K RAM upgrades which include the appropriate memory chips (as specified by the manufacturer), all necessary jumper blocks, fool-proof instructions, and our 1 year guarantee.

**MEX-16100K TRS-80 kit** ..... \$25.00  
**MEX-16101K Apple kit** ..... \$25.00  
**MEX-16102K Exidy kit** ..... \$25.00

### 16K RAM CARD - for Apple II

Expand your Apple to 64K, 1 year warranty  
**MEX-16500A Save \$70.00 !!!** ..... \$129.95

### Z-80\* CARD for APPLE

Two computers in one. Z-80 & 6502, more than doubles the power & potential of your Apple, includes Z-80\* CPU card, CP M 2.2, & BASIC-80

**CPX-30800A A & T** ..... \$299.95

### 8" DISK CONTROLLER

New from Vista Computer, single or double sided, single or double density, compatible with DOS 3.2/3.3, Pascal, & CPM 2.2, Shugart & Qume compatible

**IOD-2700A A & T** ..... \$499.95

### 8" DRIVES for APPLE

Controller, DOS, two 8" double density drives, cabinet, power supply, & cables

**Special Package Price Kit** ..... \$1399.95

### CPS MULTICARD - Mtn. Computer

Three cards in one! Real time clock, calendar, serial interface, & parallel interface - all on one card.

**IOX-2300A A & T** ..... \$199.95

### APPLE CLOCK - Cal Comp Sys

Real time clock w/battery back-up

**IOK-2030A A & T** ..... \$109.95

### PRINTER INTERFACE - C.C.S.

Centronics type I/O card w/ firmware

**IOI-2041A A & T** ..... \$99.95

### AIO, ASIO, APIO - S.S.M.

Parallel & serial interface for your Apple (see Byte pg 11)

**IOI-2050K Par & Ser kit** ..... \$139.95

**IOI-2050A Par & Ser A & T** ..... \$169.95

**IOI-2052K Serial kit** ..... \$89.95

**IOI-2052A Serial A & T** ..... \$99.95

**IOI-2054K Parallel kit** ..... \$69.95

**IOI-2054A Parallel A & T** ..... \$89.95

### A488 - S.S.M.

IEEE 488 controller, uses simple basic commands, includes firmware and cable, 1 year guarantee, (see April Byte pg 11)

**IOX-7488A A & T** ..... \$399.95

## Accessories for TRS-80

### DISK DRIVES for TRS-80

23% more storage, 8 times faster, 40 track with free patch, 120 day warranty.

**MSM-12410C Save \$125.00 !!!** ..... \$325.00

### 8" DISK DRIVES for MODEL II

2 double density drives with cabinet, power supply, & cables

**END-000433 Kit** ..... \$1050.00

**END-000434 Assembled** ..... \$1250.00

**WCA-5036A Cable (required)** ..... \$29.95

### EPROM ERASERS

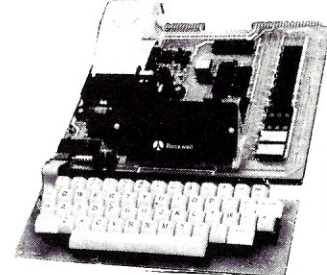
L.S. Engineering UV eraser for up to 48 EPROMs

**XME-3200 A & T** ..... \$39.99

Spectronics hi intensity industrial eraser

**XME-3100 Without timer** ..... \$69.50

## Single Board Computers



### AIM-65 - Rockwell

6502 computer with alphanumeric display, printer, & keyboard, and complete instructional manuals

**CPK-50165 1K AIM** ..... \$424.95

**CPK-50465 4K AIM** ..... \$474.95

**SFK-74600008E 8K BASIC ROM** ... \$69.95

**SFK-64600004E 4K assembler ROM** \$39.95

**PSX-030A Power supply** ..... \$64.95

**ENX-000002 Enclosure** ..... \$54.95

1K AIM, 8K BASIC, power supply, & enclosure

**Special package price** ..... \$659.95

### Z-80\* STARTER KIT - SD Systems

Complete Z-80\* computer with RAM, ROM, I/O display, keyboard, manual, and kluge area.

**CPS-30010K Kit** ..... \$369.95

**CPS-30010A A & T** ..... \$459.95

### SYM-1 - Synertek Systems

Single board computer with 1K of RAM, 1K of ROM, key-pad, LED display, 20ma & cassette interface on board.

**CPK-50020A A & T** ..... \$249.95

## Video Terminals

### AMBER SCREEN - Volker Craig

Detachable keyboard, amber on black display, 7 x 9 dot matrix, 10 program/function keys, 14 key numeric pad, 12" non-glare screen, 50 to 19,200 baud, direct cursor control, auxiliary bi-directional serial port

**VDT-351200 List \$795.00** ..... \$645.00

### VIEWPOINT - ADDS

Detachable keyboard, serial RS232C interface, baud rates from 110 to 19,200, auxiliary serial output port, 24 x 80 display.

**VDT-501210 Sale Priced** ..... \$639.95

### TELEVIDEO 950

Detachable keyboard, split screen with line lock, etched CRT, programmable function keys, on-screen status line, buffered auxiliary port, 14 x 10 dot matrix, self test, serviced nationwide by General Electric

**VDT-901250 List \$1195.00** ..... \$995.00

## Video Monitors

### HI-RES 12" GREEN - Zenith

15 MHz bandwidth, 700 lines/inch, P31 green phosphor, switchable 40 or 80 columns, small, light-weight & portable.  
**VDM-201201 List price \$150.00** .... \$118.95

### Leedex / Amdek

Reasonably priced video monitors

**VDM-801210 Video 100 12" B&W** .. \$139.95

**VDM-801230 Video 100-80 12" B&W** \$179.95

**VDM-801250 12" Green Phosphor** .... \$169.95

**VDC-801310 13" Color I** ..... \$379.95

### 12" COLOR MONITOR - NEC

Hires monitor with audio & sculptured case

**VDC-651212 Color Monitor** ..... \$479.95

### 12" GREEN SCREEN - NEC

20 MHz, P31 phosphor video monitor with audio, exceptionally high resolution - A fantastic monitor at a very reasonable price

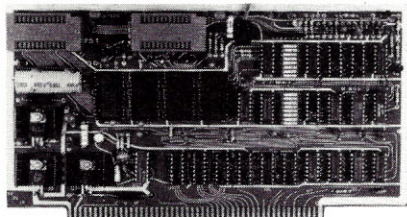
**VDM-651200 12" monitor** ..... \$269.95



# Grand Opening Sale

★★★★★ San Diego ★★★★★ Hawthorne ★★★★★ Woodland Hills ★★★★★

## S-100 PROM Boards



### PB-1 - S.S.M.

2708, 2716 EPROM board with built-in programmer

MEM-99510K Kit ..... \$154.95  
MEM-99510A A & T ..... \$219.95

### PROM-100 - SD Systems

2708, 2716, 2732, 2758, & 2516 EPROM programmer

MEM-99520K Kit ..... \$219.95  
MEM-99520A Jade A & T ..... \$269.95

### EPROM BOARD - Jade

16K or 32K uses 2708's or 2716's, 1K binary

MEM-16230K Kit ..... \$79.95  
MEM-16230A A & T ..... \$119.95

## S-100 Video

### VB-3 - S.S.M.

80 characters x 24 lines expandable to 80 x 48 for a full page of text, upper & lower case, 256 user defined symbols, 160 x 192 graphics matrix, memory mapped, has key board input.

IOV-1095K 4 MHz kit ..... \$349.95  
IOV-1095A 4 MHz A & T ..... \$439.95  
IOV-1096K 80 x 48 upgrade ..... \$39.95

### VDB-8024 - SD Systems

80 x 24 I/O mapped video board with keyboard I/O, and on-board Z-80A\*.

IOV-1020K Kit ..... \$399.95  
IOV-1020A Jade A & T ..... \$459.95

### VIDEO BOARD - S.S.M.

64 characters x 16 lines, 128 x 48 matrix for graphics, full upper, lower case ASCII character set, numbers, symbols, and greek letters, normal/reverse/blinking video, S-100.

IOV-1051K Kit ..... \$149.95  
IOV-1051A A & T ..... \$219.95  
IOV-1051B Bare board ..... \$34.95

## Motherboards

### ISO-BUS - Jade

Silent, simple, and on sale - a better motherboard

6 Slot (5 1/4" x 8")

MBS-061B Bare board ..... \$19.95  
MBS-061K Kit ..... \$39.95  
MBS-061A A & T ..... \$49.95

12 Slot (9 1/4" x 8")

MBS-121B Bare board ..... \$29.95  
MBS-121K Kit ..... \$69.95  
MBS-121A A & T ..... \$89.95

18 Slot (14 1/2" x 8")

MBS-181B Bare board ..... \$49.95  
MBS-181K Kit ..... \$99.95  
MBS-181A A & T ..... \$139.95

## Mainframes

### MAINFRAME - Cal Comp Sys

12 slot S-100 mainframe with 20 amp power supply

ENC-112105 Kit ..... \$329.95  
ENC-112106 A & T ..... \$399.95

### DISK MAINFRAME - N.P.C.

Holds 2 8" drives and a 12 slot S-100 system. Attractive metal cabinet with 12 slot motherboard & card cage, power supply, dual fans, lighted switch, and other professional features

ENS-112325 with 25 amp p.s. .... \$699.95

## S-100 Memory

### MEMORY BANK - Jade

4 MHz, S-100, bank selectable, expandable from 16K to 64K

MEM-99730B Bare board ..... \$49.95  
MEM-99730K Kit, no RAM ..... \$199.95  
MEM-16730K 16K kit ..... \$219.95  
MEM-32731K 32K kit ..... \$239.95  
MEM-48732K 48K kit ..... \$259.95  
MEM-64733K 64K kit ..... \$279.95  
Assembled & tested ..... add \$50.00

### EXPANDORAM II - S D Systems

4 MHz RAM board expandable from 16K to 64K

MEM-16630K 16K kit ..... \$275.95  
MEM-32631K 32K kit ..... \$295.95  
MEM-48632K 48K kit ..... \$315.95  
MEM-64633K 64K kit ..... \$335.95  
Assembled & tested ..... add \$50.00

### 64K RAM - Calif Computer Sys

4 MHz bank port / bank byte selectable, extended addressing, 16K bank selectable, PHANTOM line allows memory overlay, 8080 / Z-80 / front panel compatible.

MEM-64565A A & T ..... \$575.00

### 64K STATIC RAM - Mem. Merch.

64K static S-100 RAM card, 4-16K banks, up to 8 MHz

MEM-64400A A & T ..... \$825.00

### 32K STATIC RAM - Jade

2 or 4 MHz expandable static RAM board uses 2114L's

MEM-16151K 16K 4 MHz kit ..... \$169.95  
MEM-32151K 32K 4 MHz kit ..... \$299.95  
Assembled & tested ..... add \$50.00

### 16K STATIC RAM - Mem Merchant

4 MHz 16K static RAM board, IEEE S-100, bank selectable, Phantom capability, addressable in 4K blocks, "disable-able" in 1K segments, extended addressing, low power

MEM-16171A A & T ..... \$174.95

## S-100 Disk Controller

### DOUBLE-D - Jade

Double density controller with the inside track, on-board Z-80A\*, printer port, IEEE S-100, can function on an interrupt driven buss

IOD-1200K Kit ..... \$299.95  
IOD-1200A A & T ..... \$375.00  
IOD-1200B Bare board ..... \$59.95

### VERSAFLOPPY II - SD Systems

New double density controller for both 8" & 5 1/4"

IOD-1160K Kit ..... \$339.95  
IOD-1160A A & T ..... \$379.95

### DOUBLE DENSITY - Cal Comp Sys

5 1/4" and 8" disk controller, single or double density, with on-board boot loader ROM, and free CP/M 2.2\* and manual set.

IOD-1300A A & T ..... \$369.95

## S-100 I/O

### S.P.I.C. - Jade

Our new I/O card with 2 SIO's, 4 CTC's, and 1 PIO

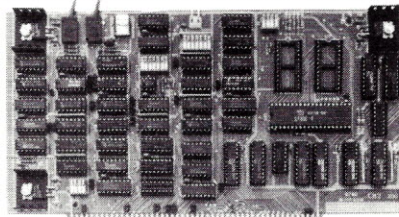
IOI-1045K 2 CTC's, 1 SIO, 1 PIO .. \$179.95  
IOI-1045A A & T ..... \$239.95  
IOI-1046K 4 CTC's, 2 SIO's, 1 PIO ..... \$219.95  
IOI-1046A A & T ..... \$299.95  
IOI-1045B Bare board w/ manual ... \$49.95

### I/O-4 - S.S.M.

2 serial I/O ports plus 2 parallel I/O ports

IOI-1010K Kit ..... \$179.95  
IOI-1010A A & T ..... \$249.95  
IOI-1010B Bare board ..... \$35.00

## S-100 CPU



### CB-2 Z-80 CPU - S.S.M.

2 or 4 MHz Z-80 CPU board with provision for up to 8K of ROM or 4K of RAM on board, extended addressing, IEEE S-100, front panel compatible.

CPU-30300K Kit ..... \$239.95  
CPU-30300A A & T ..... \$299.95

### 2810 Z-80\* CPU - Cal Comp Sys

2 4 MHz Z-80A\* CPU with RS-232C serial I/O port and on-board MOSS 2.2 monitor PROM, front panel compatible.

CPU-30400A A & T ..... \$269.95

### SBC-200 - SD Systems

4 MHz Z-80\* CPU with serial & parallel I/O ports, up to 8K of on-board PROM, software programmable baud rate generator, 1K of on-board RAM, Z-80 CTC.

CPC-30200K Kit ..... \$339.95  
CPC-30200A Jade A & T ..... \$399.95

### THE BIG Z\* - Jade

2 or 4 MHz switchable Z-80\* CPU with serial I/O, accomodates 2708, 2716, or 2732 EPROM, baud rates from 75 to 9600

CPU-30201K Kit ..... \$139.95  
CPU-30201A A & T ..... \$189.95  
CPU-30200B Bare board ..... \$35.00

## Novation Cat Modem

### CAT MODEMS - Novation

CAT 300 baud, acoustic, answer/originate  
IOM-5200A List \$189.95 ..... \$149.95

D-CAT 300 baud direct connect, answer/originate  
IOM-5201A List \$199.95 ..... \$169.95

AUTO-CAT Auto answer/originate, direct connect  
IOM-5230A List \$299.95 ..... \$239.95

### Apple-CAT - Novation

Software selectable 1200 or 300 baud, direct connect, auto-answer auto-dial, auxiliary 3-wire RS232C serial port for printer.

IOM-5232A Save \$50.00!!! ..... \$325.00

### SMARTMODEM - Hayes

Sophisticated direct-connect auto-answer/auto-dial modem, touch-tone or pulse dialing, RS-232C interface, programmable

IOM-5400A Smartmodem ..... \$269.95

## Place Orders Toll Free

Continental U.S. Inside California  
800-421-5500 800-262-1710

For Technical Inquires or Customer Service call:

213-973-7707

**JADE**  
Computer Products

4901 W. Rosecrans, Hawthorne, Ca 90250

TERMS of SALE: Cash, checks, credit cards, or Purchase Orders from qualified firms and institutions.  
Minimum Order \$15.00. California residents add 6% tax. Minimum shipping & handling charge \$3.00.  
Pricing & availability subject to change



# MICROCOMPUTING T.M. LIST OF ADVERTISERS

Reader Service Number	Page	Reader Service Number	Page	Reader Service Number	Page
91 Aardvark Technical Services.....	77	492 Eventide Clockworks, Inc.....	217	50 Mini Micro Mart.....	239
39 Advanced System Concepts, Inc.....	187	490 Findex.....	214	226 Mini Micro Mart.....	240
220 Adventure International.....	27	191 Floppy Disk Services.....	78	238 Mini Micro Mart.....	241
182 All Systems.....	75	495 Forethought Products.....	218	391 Minis & Micros.....	221
311 Alpha Byte Stores, Inc.....	CIII	206 Four Star Software Review.....	183	364 Modern Software Design.....	187
249 American Software & Systems, Inc.....	160	* Galactic Software.....	19	497 Mountain Computer, Inc.....	218
56 American Square Computers.....	38	392 General Videotex Corporation.....	221	37 Mullen Computer Products.....	213
56 American Square Computers.....	39	22 GIMIX, Inc.....	185	81 Multi Business Computer Systems.....	70
493 Anacom General Corporation.....	214	22 GIMIX, Inc.....	215	480 Muse Software.....	225
187 Ancie Labs.....	123	470 GOCI Software.....	224	186 NF Systems.....	186*
482 Apparat, Inc.....	214	42 Godbout.....	199	* NRI Schools.....	61
9 Applied Analytics.....	55	* Hanley Engineering.....	154	* Netronics R & D Ltd.....	54
319 Armadillo Computer Commuter.....	31	* Hanley Engineering.....	155	* Netronics R & D Ltd.....	115
193 Aurora Software.....	160	243 Happy Hands.....	123	* Netronics R & D Ltd.....	218
96 Automated Equipment.....	134	265 Hobby Robotics.....	221	499 Novation, Inc.....	220
96 Automated Equipment.....	141	498 Houston Instrument.....	216	130 Olenky Bros. Inc.....	71
55 Automated Simulations.....	87	279 IDPC Co.....	221	201 Omega Microwave.....	93
477 Avant-Garde Creations.....	227	128 Innovative Technology.....	179	89 Omega Sales Company.....	125
489 Axion, Inc.....	216	<b>Instant Software</b>		* Omni Software Systems, Inc.....	183
* B.G. Micro.....	198	405 Gypsy.....	46,47	140 Omnitek Systems.....	237
124 B.T. Enterprises.....	68	408 Education = Microcomputers.....	131	356 The On Line Computer Tel. Dir.....	78
472 Business Planning Systems.....	226	406 Christmas.....	97	310 Orange Micro, Inc.....	89
148 CDR Systems, Inc.....	187	407 Test your wings.....	29	496 Orange Micro, Inc.....	220
256 The CPU Shop.....	119	75 Programmers Kit.....	91,172,183,187,221	149 Osborne/McGraw Hill.....	43
79 C&S Electronics Mart Ltd.....	86	77 Integrand Research Corporation.....	165	468 PCD Systems, Inc.....	224
488 California Computer Systems.....	216	465 Interactive Microware, Inc.....	225	172 Pacific Exchanges.....	115
* Call A.P.P.L.E.....	65	151 Interface, Inc.....	167	172 Pacific Exchanges.....	132
481 Centec Process Systems, Inc.....	227	484 International Data Sciences, Inc.....	218	172 Pacific Exchanges.....	141
473 Charles Mann & Associates.....	226	3 Intertec Data Systems.....	3	172 Pacific Exchanges.....	171
* CHIP Magazine.....	220	203 J.C. Datatron.....	168	172 Pacific Exchanges.....	172
170 Chips & Dale.....	173	180 J.E.S. Graphics.....	127	153 Pacific Office Systems.....	129
376 Communications Electronics.....	195	92 J.P.C. Products.....	171	1 Percom Data Co., Inc.....	CII
466 Communitree Group.....	224	126 J.R. Inventory Co.....	133	266 Perry Oil & Gas.....	57
90 CompuCover.....	138	48 Jade Computer Products.....	207	303 Personal Computer Systems.....	140
43 Compumart.....	196	48 Jade Computer Products.....	208	146 Pocket Computer Newsletter.....	219
43 Compumart.....	197	48 Jade Computer Products.....	209	202 Progressive Computing.....	132
42 CompuPro.....	199	41 Jameco.....	200	475 Prosoft.....	227
147 CompuServe.....	159	41 Jameco.....	201	44 Quest Electronics.....	203
* Computer Book Club.....	149	* John Bell Engineering.....	161	52 RNB Enterprises.....	205
320 Computer Case Company.....	127	222 Kalgo.....	23	390 RW Electronics.....	64
299 Computer Components Corporation.....	81	<b>Kilobaud Microcomputing</b>		101 Racet Computers.....	160
18 Computer Design Labs.....	109	* Subscriptions.....	35,83,97,187	102 Rand's, Inc.....	58
120 Computer Discount of America.....	82	* Desktop Computing.....	99	464 Reality Automation, Inc.....	224
349 The Computerist's Directory.....	184	* University Microfilms.....	187	* Realty Software Company.....	64
384 Computer Mail Order.....	69	* Dealers.....	219	478 Roger Hagen Associates.....	227
331 Computer Marketing Services, Inc.....	23	* Books.....	188,189,190	74 Rondure Company.....	71
110 Computer Peripherals Unlimited.....	70	* Boxes, Binders.....	219,221	111 SZ Software Systems.....	221
362 Computer Plus.....	139	* Encyclopedia.....	171	* Sinclair Research Ltd.....	14
182 Computer Services Company of America.....	75	* Manuscripts.....	134	* Sinclair Research Ltd.....	15
36 Computer Shopper.....	143	86 L & J Enterprises.....	226	132 Sixty Eight Micro Journal.....	67
227 Computers Wholesale.....	164	* L & S Computerware.....	165	205 Electronics.....	206
6 Computronics.....	111	198 LNW Research.....	235	* Snappware, Inc.....	63
197 Compuware Corporation.....	183	394 Laredo Systems, Inc.....	113	385 Software Concepts.....	225
297 Concord Computer Products.....	204	491 Laredo Systems, Inc.....	216	302 The Software Connection.....	50
292 Coosol, Inc.....	71	355 Leading Edge Products.....	CIV	213 Software Consultants.....	187
346 Corsair Computer Corp.....	64, 238	23 Level IV Products, Inc.....	142	479 Software Resources, Inc.....	226
486 Creative Software Development.....	216	312 Lifeboat Associates.....	121	469 Solartek.....	226
* Cybernetics, Inc.....	45	84 Linca Industries, Inc.....	179	229 Speedway Electronics.....	78
145 DG Electronic Development.....	135	373 Logical Devices, Inc.....	142	60 Standard & Poor's Corporation.....	13
483 DIP, Inc.....	216	322 Logical Systems.....	59	217 Standard Software Corp. of America.....	31
293 D & N Micro Products.....	83	234 Magnolia Microsystems.....	91	143 Standard Software Corp. of America.....	68
113 Data Resource Corporation.....	165	471 Marketing Essentials, Inc.....	224	306 Standard Software Corp. of America.....	129
63 Davis Systems, Inc.....	127	218 Mason Electronics.....	50	179 Stellation Two.....	232
* Digital Research Computers.....	192	72 Master Electronics.....	129	296 The Stocking Source.....	95
* Digital Research Computers.....	193	494 Matchless Systems.....	217	189 TAB Sales Company.....	170
474 Digital Research Corporation.....	224	161 Meta Technologies Corporation.....	7	318 TNW Corporation.....	183
* Digital Research Parts.....	198	108 Micro Architect.....	31	233 Tarheel Software Systems.....	183
61 Digital Systems Engineering.....	129	260 The Microcomputer Warehouse.....	168	328 Texas Computer Systems.....	56
270 Discount Data Forms.....	91	308 Micro 80 Inc.....	115	95 Timin Engineering Company.....	227
250 Discount Software Group.....	37	* Micro Ink, Inc.....	153	388 Trak, Inc.....	79
34 Dr. Daley's Software.....	217	68 Micromail.....	227	* VR Data Corporation.....	144
174 Dugger's Growing Systems.....	187	100 Micro Management Systems.....	185	476 Valley Forge Software Group.....	226
87 Dwo Quong Fok Lok Sow.....	56	134 Micro Matrix.....	145	214 Van Horn Office Supply.....	127
485 E. & U. Engel Consulting.....	214	31 Micro Merchants.....	177	* Video Play Magazine.....	21
345 Eclectic Systems.....	169	347 Micromint, Inc.....	42	285 W.W. Components Supply.....	191
82 Ecosoft.....	165	253 Microstuf.....	17	* Wameco, Inc.....	202
169 Elcomp Publishing, Inc.....	51	* Microsystems Magazine.....	170	45 Westland Electronics.....	221
25 Electronics Center.....	194	150 Midwest Computer Peripherals.....	233	* West Side Electronics.....	213
93 Electronic Specialists.....	83	144 Midwest Scientific Instruments.....	100	324 Windham Software.....	105
* Electrovalue Industrial.....	145	144 Midwest Scientific Instruments.....	101	163 Wintek Corporation.....	67,187
272 Ellis Computing.....	197	* Mikos.....	202	487 Wintek Corporation.....	217
254 Erickson Communications.....	98	255 Miller Microcomputer Services.....	12	122 World Wide Electronics.....	172
327 Essex Publishing Co.....	226	304 Mini Micro Mart.....	179		

For further information from our advertisers, please use the Reader Service card.

\* This advertiser prefers to be contacted directly.



# LETTERS TO THE EDITOR

(from page 30)

I am in complete agreement with Bob Stratton's comments, but would like to clarify a few points. I don't believe the STD bus will ever replace the S-100 either, and the purpose of the article was to acquaint readers with these new cards as a viable alternative to S-100. Granted, Pro-Log had the original idea but the bus was developed jointly by Pro-Log and Mostek. The packaged system offered by Pro-Log has no mass storage or extensive operating system, which basically limits it to engineering development.

The 8088 CPU Bob mentioned is not a true implementation of the STD bus, and peripheral cards must be chosen very carefully to ensure compatibility. There are several 16-bit implementations under way but they detract from the original purpose of the bus, to standardize all eight-bit machines.

As more of these cards and systems filter into homes and small businesses, standardization and compatibility will play a crucial role in its acceptance. That's one lesson it took S-100 manufacturers several years to finally figure out.

**Don Langford**  
Huntsville, AL

## Osborne the Obnoxious

Osborne the obnoxious, you betcha!

My local Osborne dealer wanted a \$20 check-out fee to ascertain the machine wasn't DOA. Thanks but no thanks. Are there any others out there that have reacted similarly? Hidden charges may be OK but such a blatant disregard toward a paying customer I can't stomach.

**Duncan Moyer**  
Auburn, CA

## Alternatives to Ma Bell

A number of recent articles and news clips have correctly pointed out that there are a number of alternatives to the Bell System for low-cost toll telephone service. However, these articles have not mentioned Western Union's Metro I Low-Cost Toll Telephone Service.

Metro I provides service from the top 45 major metropolitan areas to 145 metropolitan areas. The backbone of the Metro I service offerings is the Western Union transcontinental microwave and satellite transmission network, which allows Western Union to have complete control over the end-to-end performance of our service.

The Metro I approach to the market is a combination of the best price and the most complete service. We have 24-hour per day computer monitoring of service quality and a grade of service which assures that 99 of 100 calls attempted will be completed on the first attempt. (Of course, this excludes situations where the called number is busy or does not answer.)

With AT&T's 16 percent toll telephone rate increase, two successive WATS rate increases, increasing many users' bills by 50 percent to 100 percent, and a 35 percent private line increase, I am sure your readers will want to know about the alternatives.

**Joseph E. Lopez**  
Senior Product Manager  
Specialized Communications  
Western Union Telegraph Company



## She Loves Me

Why in this day of micromarvels should the tormented lover bother to expend his energy plucking the petals from flowers to answer that age old query, "She loves me, she loves me not . . ."? Now with the aid of modern technology (i.e., microcomputer with BASIC) you can know your fate in seconds. See Listing 1.

```
10 PRINT "PROGRAM FOR THE
    LOVELORN"
20 PRINT "SAVES TIME, EFFORT
    AND AGGRAVATION"
```

```
30 PRINT "IS THE OBJECT OF
    YOUR DESIRE MALE(0) OR
    FEMALE(1)?"
40 INPUT Y
50 I=INT(100*RND)
60 IF Y=1 GO TO 200
100 GOSUB 500
110 I=I-1
120 IF I=0 GO TO 700
130 GOSUB 520
140 I=I-1
160 IF I=0 GO TO 600
170 GO TO 100
200 GOSUB 400
210 I=I-1
220 IF I=0 GO TO 700
230 GOSUB 420
240 I=I-1
250 IF I=0 GO TO 600
260 GO TO 200
400 PRINT "SHE LOVES ME"
410 RETURN
420 PRINT "SHE LOVES ME NOT"
430 RETURN
500 PRINT "HE LOVES ME"
510 RETURN
520 PRINT "HE LOVES ME NOT"
530 RETURN
600 PRINT "SORRY KIDDO!"
610 PRINT "BETTER LUCK NEXT
    TIME"
620 PRINT "TRY AGAIN? NO=0,
    YES=1
630 INPUT Z
640 IF Z=1 GO TO 50
650 GO TO 1000
700 PRINT "WAS THERE EVER ANY
    DOUBT?"
1000 END
```

Listing 1

## Many Thanks

I would like to thank David S. Ailes of Winter Park, FL, for his kind comments in the August Letters to the Editor on my thoughts expressed in Perspectives in the June *Microcomputing*.

Many of us out here would like to hear more about what he, and others like him, have been trying to do, and the problems he has encountered along the way. Some of us ought to be able to help him get full use out of his Apple computer.

I am also looking forward to *Desktop Computing*, which is targeted to bring together the people who need help and those who can give it. I think they call that user-friendly. By helping those who are just beginning to use micros, *Desktop Computing* also ought to swell the ranks of readership of *Microcomputing* with those ready to graduate.

**Martin Klaver**  
Sicklerville, NJ



## Microcomputer Graphics Workshop

A one-day workshop designed as a practical preparation for making intelligent purchasing decisions will be held in Boston on Nov. 14. It will present an overview of applications, graphics features, system integration considerations, price ranges and information sources. Registration is \$20.

For information, call or write Jean L. Graef, Cambridge Development Laboratory, 36 Pleasant St., Watertown, MA 02172 (617-926-0869).

## COMDEX Show

The third annual COMDEX Conference and Exposition for independent sellers (ISOs) of small computer products will be held at the Las Vegas (NV) Convention Center Nov. 19-22. The conference will feature business, marketing and financial topics of relevance to ISOs.

For further information, write The Interface Group, 160 Speen St., Framingham, MA 01701 or call 800-225-4620 (in Massachusetts, 617-879-4502).

## Philadelphia Area Computer Show

A show sponsored by the Philadelphia Area Computer Society will feature applications of small computers in education, business and leisure. Show dates: Nov. 12-14.

For further information contact Stephen A. Longo, Ph.D., Physics Department, La Salle College, Philadelphia, PA 19141 (215-951-1255).

## California Computer Faire

The Silicon Gulch Games Faire & AppleFest will focus on electronic products for entertainment and Apple-related products. Scheduled for Nov. 21-22, at the San Jose Convention Center.

For further information, contact Computer Faire, 333 Swett Road, Woodside, CA 94062 (415-851-7075).

## Symposium on Small Computers in the Arts

A wide range of presentations are planned to bring together people interested in using small computers in the audio and visual arts. The symposium will be held at the University City Holiday Inn on the campus of the University of Pennsylvania on Nov. 20-22.

For information, write to Symposium on Small Computers in the Arts, Box 1954, Philadelphia, PA 19105 (215-243-8109).

## Teleconferencing Technologies Seminar

The Teleconferencing Technologies Seminar will be held at the Hilton Harvest House, Boulder, CO, on Dec. 7 and 8, 1981. The seminar will focus on how to use teleconferencing to conduct business transactions and improve effectiveness and decision-making. Demonstrations of computer, video and audio teleconferencing will be conducted, offering hands-on experience.

The seminar is jointly sponsored by Cross Communications Co. and Colorado Video Inc.

The cost of the seminar is \$395, exclusive of meals and

housing.

For further information contact Cross Communications Co., 934 Pearl, Boulder, CO 80302 (303-499-8888).

## International Computer Music Conference

The 1981 International Computer Music Conference will be held Nov. 5-8, 1981, in Denton, TX.

For further information contact Larry Austin, School of Music, North Texas State University, Denton, TX 76203 (817-788-2791).

## Consumer Electronics Show

The winter International Electronics Show will be held at the Las Vegas Convention Center Jan. 7-10.

For further information contact William T. Glasgow, Vice President, Consumer Electronics Shows, Two Illinois Center, Suite 1607, 233 North Michigan Ave., Chicago, IL 60601 (312-861-1040).

## Micros in Education

Arizona State University is hosting the tenth annual Math/Science Conference on Jan. 15 and 16, 1982. The conference will focus on the microcomputer as a tool for instruction, as a research instrument and as an information manager.

For further information contact Nancy Watson, Conference Codirector, 203 Payne Hall, Arizona State University, Tempe, AZ 85287.

## National Careers for the Disabled Symposium

The first National Careers for the Disabled Symposium will be sponsored by Commodore Business Machines, Inc., in association with Careers for the Disabled, Inc. The symposium will be held on Dec. 4-6, 1981, at the Convention Center in Baltimore, MD.

For additional information contact Careers for the Disabled, 261 Madison Ave., Suite 1102, New York, NY 10016.

## NM Computer Fair

The New Mexico Computer Society will host the third annual New Mexico Computer Fair Saturday, Nov. 14, 1981, at the Albuquerque Civic Auditorium from 10 AM until 6 PM. There will be no charge for admission. For more information call Ron Benninghoff (505-831-3683 or 505-836-0065 after 4 PM Mountain time).

## Computer Electronics Flea Market

The second annual SCARA Computer Electronics Flea Market will be held on Nov. 8, 1981, from 10 AM to 4 PM at the North Haven Recreation Center on Linseley St. in North Haven, CT. Refreshments will be served. Sellers' spaces are \$5. Admission is \$1, free for children under 12 with an adult. Special arrangements are available for dealers. Send check or M.O. (payable to SCARA) to PO Box 81, North Haven, CT 06473. SCARA is a non-profit organization.



## Texas Computer Show Postponed

James E. Myles, group show manager for Intercontinental Trade Shows Inc., has announced that the Texas Computer Show, scheduled to take place in the Dallas Convention Center from Jan. 20-22, 1982, has been postponed until March 9-11, 1983.

For more information contact James E. Myles (416-252-7791) or Catherine Manor (214-761-9108).

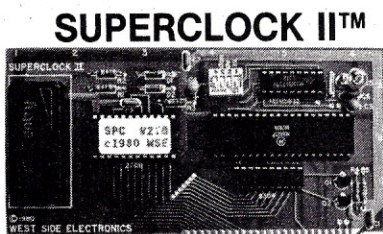
## FORTH Interest Group National Convention

The FORTH Interest Group (FIG) announced the scheduling of its National Convention to be held Nov. 28, 1981, 9 AM-6 PM at the Santa Clara Marriott Hotel. This one day convention will include presentations, workshops, hands-on equipment and a number of vendor exhibits. An evening dinner will follow the day's activities and will feature a speaker. Registration is \$3 with dinner extra.

The theme of the convention this year is education and the FORTH language and FORTH program applications. Papers are being solicited for presentation at the convention. Those wishing to present papers or exhibit should send a letter of intent to Convention Chairman, FORTH Interest Group, PO Box 1105, San Carlos, CA 94070.

## IT'S ABOUT TIME!

### A COMPLETE CLOCK/CALENDAR SYSTEM FOR THE APPLE II.



#### FEATURES:

- Timing from milliseconds to 99 years
- 12/24 Hour formats plus day of week
- Does not use C800-CFFF address space
- Automatic dating of files stored on disk
- Automatic updating of PASCAL's Filer
- Up to four software controlled interrupts
- Full battery operation for up to 10 years

**SUPERCLOCK II COMPLETE SYSTEM . . . . . \$159**



**TIME-CLOCK II** program automatically keeps track of the time you spend on your computer for each job, client, program, etc. Then prints out a detailed report. Requires SUPERCLOCK II, Applesoft, and disk . . . . . \$30

### west side electronics

P.O. Box 636D, Chatsworth, CA 91311 Phone (213) 884-4794

All orders - add \$3.50 for postage, insurance, and handling (\$7.00 outside Continental USA). California residents add 6% sales tax. A 3% surcharge will be added to all credit card orders.

Apple, Apple II, and Applesoft are trademarks of Apple Computer, Inc.

# MULLEN

## S-100 PRODUCTS

### 1 EXTENDER BOARD WITH LOGIC PROBE \$89 assem/tested

with these features for use in testing your S-100 boards.

- Logic probe with display shows; (H) for TTL logic high, (L) for low, (O) for open or 3-state, and (P) for pulse.
- Pulse catcher switch latches (P) aids in detecting infrequent pulses.
- Jumper links in +8 and +16 volt lines allow current measurement, switching and fusing.
- Interlaced signal and ground traces reduce noise.
- Pushbutton reset allows restarting test programs.
- Formed leads on both sides of the edge connector for easy scope probe attachment.
- Prototyping area and regulated 5 volts allows construction of special test circuits on the board.
- Edge connector label shows signal names and pin numbers.
- 5 1/2" high, on quality FR-4 material, solder masked and gold plated on mating surfaces.

### 2 INDUSTRIAL EXTENDER BOARD \$99 assem/tested

saves time where many boards are tested every day.

- ZERO-INSERTION FORCE edge connector.
- Switch and indicator light control +8 and +16 volt power.
- Pushbutton reset allows restarting test programs.
- Fuses in power lines protect test computer.
- Interlaced signal and ground traces reduce noise.
- Formed leads on both sides of edge connector for easy scope probe attachment.
- Edge connector labels show signal names and pin numbers
- 6" high, on quality FR-4 material, solder masked and gold plated on mating surfaces.

### 3 RELAY OPTO-ISOLATOR CONTROLLER BOARD \$219 assem/tested

for signal switching, or controlling low power devices.

- 8 reed relays.
- 8 opto-isolators with input bridge rectifiers, series resistors, and filter capacitors.
- 256 switch selectable port addresses.
- Removable terminal block for use with up to 16 AWG wire.
- LED indicators in relay drive circuits.
- Socket for input simulation or testing.
- Quality FR-4 material, solder masked & gold plated on bus connector.
- Instructions include programming examples.

### 4 TRIAC OPTO-ISOLATOR CONTROLLER BOARD \$219 assem/tested

for controlling line voltage AC devices.

- 8 triacs with snubbers for controlling inductive loads, and zero crossing isolated drive circuitry.
- 8 opto-isolators with input bridge rectifiers, series resistors, and filter capacitors.
- 256 switch selectable port addresses.
- Removable terminal block for use with up to 16 AWG wire.
- LED indicators in triac drive circuits.
- Socket for input simulation or testing.
- Quality FR-4 material, solder masked & gold plated on bus connector.
- Instructions include programming examples.

**MULLEN COMPUTER PRODUCTS** ✓37  
BOX 6214, HAYWARD, CA 94544

OR PHONE (415) 783-2866 • VISA/MASTERCARD ACCEPTED.  
INCLUDE \$1.50 FOR SHIPPING & HANDLING.  
CALIFORNIA RESIDENTS ADD TAX.



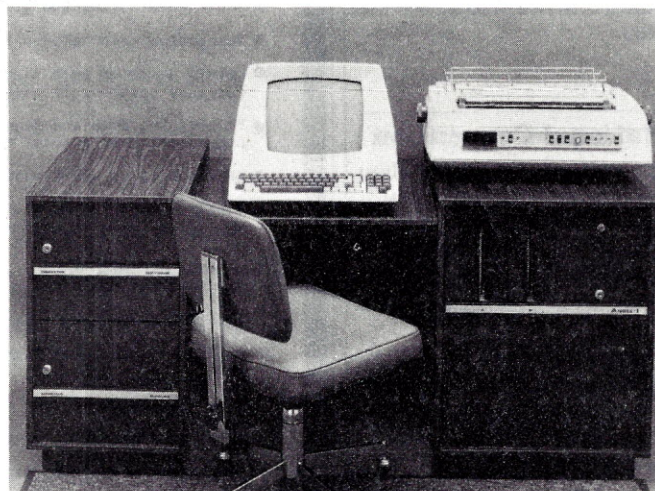
## Micro for Those on the Go Anacom Printers Multi-User System

### A Portable Computer With Battery Backup

Findex, 20775 South Western Ave., Torrance, CA 90501, has introduced a complete microcomputer system in a compact package. The Findex terminal-sized micro combines a keyboard, display, disk drive and printer. It interfaces to a variety of peripherals, such as larger printers or multiple hard-disk drives. Serial, parallel and S-100 bus interfaces are standard; American (Bell 103) and European (CCITT) acoustic couplers are optional. The Findex supports Business BASIC, COBOL, FORTRAN, Pascal, APL and PL/I. Applications software, including a patient accounting system for medical offices, is available from Findex. The computer will operate on 110 V, 200 V or 12 V. Battery backup allows the machine to operate for up to 30 minutes without outside power. The unit sells for \$6980 to \$20,000, depending on peripherals and software. Reader Service number 490.



*The Findex computer system.*

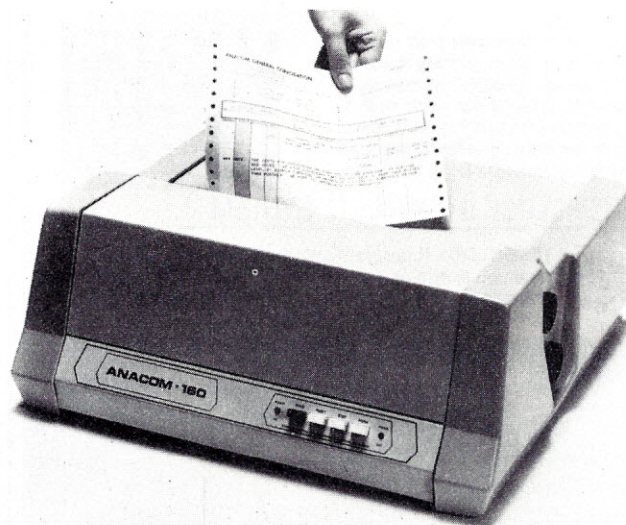


*The Angel-I development system from E. & U. Engel Consulting.*

### Paper-Saving Printers

The Anacom-160 and 160Z serial matrix printers are available from Anacom General Corporation, 1116 East Valencia Drive, Fullerton, CA 92631. These printers promise to end wasted forms forever—the paper-handling tractors are below the platen so that preprinted forms, after

printing, can be torn within .050 inches of the print line. The head is designed for a print-life in excess of 600 million characters. The ribbon cartridge, which has a 3-million-character life, is clean and easy to handle and can be changed in seconds. The 160Z has dot-addressable graphics, compressed print, serial and parallel interface, x-on, x-off protocol and other



*The Anacom-160 printer.*

features. The Anacom-160 costs \$1750; the 160Z costs \$2150. Reader Service number 493.

### Multi-User System For Program Development

The Angel-I is a multi-terminal word- and data-processing system supporting up to 16 terminals. The CP/M-based Angel-I claims strong software support from over 400 vendors. The system comprises an S-100 bus, Z-80 CPU, 64K byte random access memory, two eight-inch disk drives, an 80-character CRT and a daisywheel printer, and is housed in a formica desk. Price is \$7995. Various terminals and peripherals are also available from the supplier.

E. & U. Engel Consulting, 1719 S. Carmelina Ave., Los Angeles, CA 90025. Reader Service number 485.

### PROM Blaster for TRS-80 or Apple

Apparat, Inc., 4401 S. Tamarac Parkway, Denver, CO 80237, is offering their





## JUDGE THE REST, THEN BUY THE BEST

Only GIMIX offers you **SOFTWARE SWITCHING** between **MICROWARE's OS-9** and **TSC's FLEX**. Plus you get the power of the **GMXBUG** system monitor with its advanced debugging utility, and memory manipulation routines. A wide variety of languages and other software is available for these two predominant 6809 Disk Operating Systems.

*You can order a system to meet your needs, or select from the 6809 Systems featured below.*

## JUDGE THE FEATURES AND QUALITY OF GIMIX 6809 SYSTEMS

GIMIX' CLASSY CHASSIS™ is a heavyweight aluminum mainframe cabinet with back panel cutouts to conveniently connect your terminals, printers, drives, monitors, etc. A 3 position keyswitch lets you lock out the reset switch. The power supply features a ferro-resonant constant voltage transformer that supplies 8V at 30 amps, +15V at 5 amps, and -15V at 5 amps to insure against problems caused by adverse power input conditions. It supplies power for all the boards in a fully loaded system plus two 5 1/4" drives (yes! even a Winchester) that can be installed in the cabinet. The Mother board has fifteen 50 pin and eight 30 pin slots to give you the most room for expansion of any SS50 system available. 11 standard baud rates from 75 to 38.4K are provided and the I/O section has its own extended addressing to permit the maximum memory address space to be used. The 2 Mhz 6809 CPU card has both a time of day clock with battery back-up and a 6840 programmable timer. It also contains 1K RAM, 4 PROM/ROM/RAM sockets, and provides for an optional 9511A or 9512 Arithmetic Processor. The RAM boards use high speed, low power STATIC memory that is fully compatible with any DMA technique. STATIC RAM requires no refresh timing, no wait states or clock stretching, and allows fast, reliable operation. The system includes a 2 port RS232 serial interface and cables. All GIMIX boards use gold plated bus connectors and are fully socketed. GIMIX designs, manufactures, and tests in-house its complete line of products. All boards are twice tested, and burned in electrically to insure reliability and freedom from infant mortality of component parts. All systems are assembled and then retested as a system after being configured to your specific order.

### 56KB 2MHZ 6809 SYSTEMS WITH GMXBUX/FLEX/OS-9 SOFTWARE SELECTABLE

With #58 single density disk controller . . . . .	<b>\$2988.59</b>
With #68 DMA double density disk controller . . . . .	<b>\$3248.49</b>
to substitute Non-volatile CMOS RAM with battery back-up, add . . . . .	300.00
for 50 Hz export power supply models, add . . . . .	30.00

Either controller can be used with any combination of 5" and/or 8" drives, up to 4 drives total, have data recovery circuits (data separators), and are designed to fully meet the timing requirements of the controller I.C.s.

### 5 1/4" DRIVES INSTALLED IN THE ABOVE with all necessary cables

	SINGLE DENSITY		DOUBLE DENSITY		
	Formatted	Unformatted	Formatted	Unformatted	
40 track (48TPI) single sided	199,680	250,000	341,424	500,000	2 for <b>\$700.00</b>
40 track (48TPI) double sided	399,360	500,000	718,848	1,000,000	2 for <b>900.00</b>
80 track (96TPI) single	404,480	500,000	728,064	1,000,000	2 for <b>900.00</b>
80 track (96TPI) double	808,960	1,000,000	1,456,128	2,000,000	2 for <b>1300.00</b>

Chart shows total capacity in Bytes for 2 drives.

Contact GIMIX for price and availability of 8" floppy disk drives and cabinets; and 5" and 8" Winchester hard disk system.

### 128KB 2Mhz 6809 DMA Systems for use with TSC's UNIFLEX or MICROWARE's OS-9 Level 2

(Software and drives not included) . . . . .	<b>\$3798.39</b>
to substitute 128KB CMOS RAM with battery back-up, add . . . . .	600.00
for each additional 64KB NMOS STATIC RAM board, add . . . . .	639.67
for each additional 64KB CMOS STATIC RAM board, add . . . . .	988.64
for 50 Hz export power supply, add . . . . .	30.00

**NOTE:** UNIFLEX can not be used with 5" minifloppy drives.

GIMIX has a wide variety of RAM, ROM, Serial and Parallel I/O, Video, Graphics, and other SS50 bus cards that can be added now or in the future. Phone or write for more complete information and brochure.

## THE SUN NEVER SETS ON GIMIX USERS

GIMIX Systems are found on every continent, except Antarctica. (Any users there? If so, please contact GIMIX so we can change this.) A representative group of GIMIX users includes: **Government Research and Scientific Organizations** in Australia, Canada, U.K., and in the U.S.; NASA, Oak Ridge, White Plains, Fermilab, Argonne, Scripps, Sloan Kettering, Los Alamos National Labs, AURA. **Universities:** Carleton, Waterloo, Royal Military College, in Canada; Trier in Germany; and in the U.S.; Stanford, SUNY, Harvard, UCSD, Mississippi, Georgia Tech. **Industrial users** in Hong Kong, Malaysia, South Africa, Germany, Sweden, and in the U.S.; GTE, Becton Dickinson, American Hoechst, Monsanto, Allied, Honeywell, Perkin Elmer, Johnson Controls, Associated Press, Aydin, Newkirk Electric, Revere Sugar, HI-G/AMS Controls, Chevron. **Computer mainframe and peripheral manufacturers,** IBM, OKI, Computer Peripherals Inc., Qume, Floating Point Systems. **Software houses;** Microware, T.S.C., Lucidata, Norpak, Talbot, Stylo Systems, AAA, HHH, Frank Hogg Labs, Epstein Associates, Softwest, Dynasoft, Research Resources U.K., Microworks, Analog Systems, Computerized Business Systems.



GIMIX Systems are chosen by the Pros because of quality, reliability and features.

**GIMIX** inc. 22

*The Company that delivers Quality Electronic products since 1975.*

1337 WEST 37th PLACE, CHICAGO, IL 60609  
(312) 927-5510 • TWX 910-221-4055

#### TO ORDER BY MAIL

SEND CHECK OR MONEY ORDER OR USE YOUR VISA OR MASTER CHARGE. Please allow 3 weeks for personal checks to clear.

U.S. orders add \$5 handling if order is under \$200.00. Foreign orders add \$10 handling if order is under \$200.00.

Foreign orders over \$200.00 will be shipped via Emery Air Freight COLLECT, and we will charge no handling. All orders must be prepaid in U.S. funds. Please note that foreign checks have been taking about 8 weeks for collection so we would advise wiring money, or checks drawn on a bank account in the U.S.. Our bank is the Continental Illinois National Bank of Chicago, account #73-32033 Visa or Master Charge also accepted.

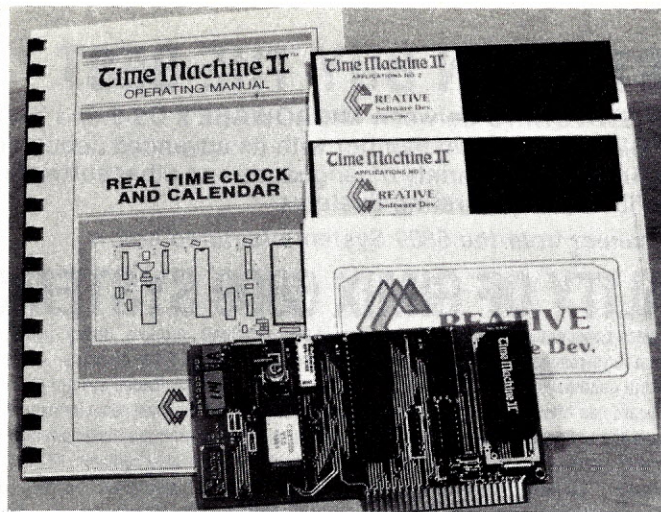
GIMIX INC. reserves the right to change pricing and product specifications at any time without further notice.

GIMIX\* and GH0ST\* are registered trademarks of GIMIX Inc.

©. 1981 GIMIX Inc.

FLEX AND Uniflex are trademarks of Technical Systems Consultants Inc. OS-9 is a trademark of Microware Inc. See their ads for other GIMIX compatible software





*Time Machine II from Creative Software Development.*

new PROM burner for the Apple II and TRS-80 Models I and III. The Apparat PROM blasting system (APB) will program nine different EPROMs on the same board. The APB will program model 2704, 2708, 2716, 2732, 2508, 2516 and 2532 EPROMs. The package includes the interface card, a complete set of personality modules, software on disk and a detailed instruction manual. Price is \$149. Reader Service number 482.

### Real-Time Clock and Calendar

Time Machine II is an intelligent real-time clock and calendar peripheral for the Apple II computer. It is crystal-controlled, and operates at a range of one second to 99 years. The 2048-byte firmware driver uses a dynamic bank switching technique and executes in the same space as other 256-byte clock drivers. Since bank switching occurs dynamically, all options are software selectable. A modified disk operating system adds the time and date to

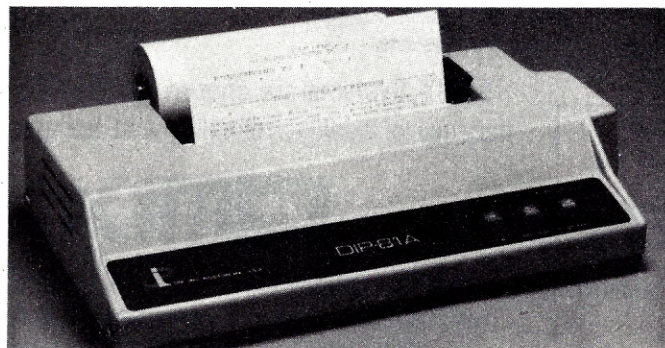
files each time they are modified. The catalog command has also been modified to display the current time and date. Time Machine II is priced at \$135.

Creative Software Development, 4657 Thayne Drive, West Valley City, UT 84120. Reader Service number 486.

### A Utility Printer

The Model DIP-81A is a reliable dot matrix printer designed for continuous duty cycle. The printer can accept data while printing, and can be readily interfaced with dumb CRT terminals, modems or Teletype replacement equipment. The Model DIP-81A features 7x7 or expanded 14x7 matrix printing, upper/lowercase character set, 100-characters-per-second bidirectional printout, clean ribbon-cartridge loading and a low profile. It uses sheet, roll or fanfold form paper. Centronics-compatible parallel interface is standard. The printer costs \$499.

DIP, Inc., 745 Atlantic Ave.,



*The DIP-81A dot matrix impact printer.*

Boston, MA 02111. Reader Service number 483.

### Five Megabytes of Memory

The LS525 5M memory system incorporates a Seagate ST506 5¼-inch Winchester disk drive, the LDOS disk operating system from Logical Systems, a Microcomputer Power Inc. linear power supply and Laredo's LSI 500 series controller. A separate off-board host adapter allows the LS525 to be cross-connected to most CPU and bus types. Up to three additional Winchester disk drives can be added to the system with no software modifications. All TRS-80 programs currently running under TRSDOS or NEWDOS will run under the LDOS operating system. The LS525 memory system is \$3750.

Laredo Systems, Inc., 669 Giraudo Drive, San Jose, CA 95111. Reader Service number 491.

### High-Speed Four-Port Interface

The CCS Model 2720 lets S-100 system users exchange bidirectional parallel data at high speeds with three peripherals and transmit parallel data to a fourth peripheral. Data is transferred at TTL levels on separate eight-bit input and output pathways, and a four-lines-per-port handshaking scheme ensures thorough communication protocol of both transmitter and receiver. A status register reflects each port's handshake activity so software can monitor the status of the input and output registers. Price is \$250.

California Computer Systems, 250 Caribbean Drive,

Sunnyvale, CA 94086. Reader Service number 488.

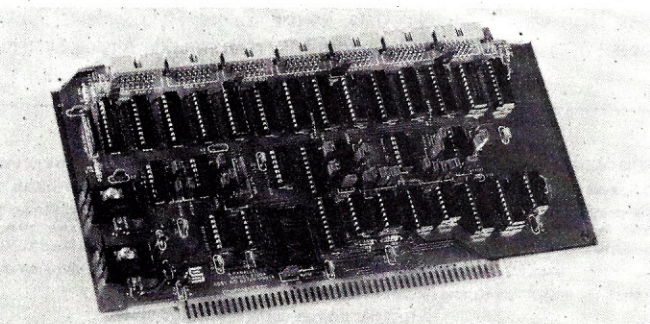
### More Memory for Atari

Axon, Inc., 170 N. Wolfe Road, Sunnyvale, CA 94086, has announced its 128K byte memory system for the Atari 800. The RAMDISK memory system comes with software that makes the new system function like a disk device. The system can also be programmed as bank-selectable random access memory. The RAMDISK memory system and Atari 810 disk drive together are compatible with existing software written for the Atari 800 system. Function for function, the RAMDISK system is up to 20 times faster than the Atari 810. The price is \$699. Reader Service number 489.

### Table-Top Drum Plotter

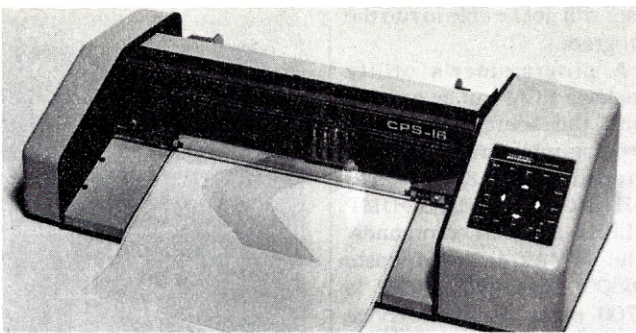
The CPS-16 is a space-saving four-pen plotter. It's designed to provide professional-quality output for drafting, surveying, business and other applications. The plotter produces four-color drawings in custom sizes on paper, mylar or vellum. It accepts data from either a standard EIA RS-232C or 20 mA current loop data source and can be operated on-line or in a timesharing environment. The CPS-16 features up to 172 firmware-generated characters containing upper/lowercase letters, positive paper feed, circular buffer memory and protocol for detection and correction of data transmission errors. Prices start at \$10,900.

Houston Instrument, One Houston Square, Austin, TX



*The CCS Model 2720 interface from California Computer Systems.*





Houston Instrument's CPS-16 plotter.

78753. Reader Service number 498.

### Disk Subsystem

The MS-800C disk subsystem is compatible with the Heath/Zenith-89, Apple II, TRS-80 Model II and all S-100-based units. The subsystem includes case, power supply, fan, cables and a choice of four different drive configurations: one single-sided drive, \$1050; two single-sided drives, \$1595; one double-sided drive, \$1395; and two double-sided drives, \$2095.

Matchless Systems, 18444 South Broadway, Gardena, CA 90248. Reader Service number 494.

### Distributed Control Micro

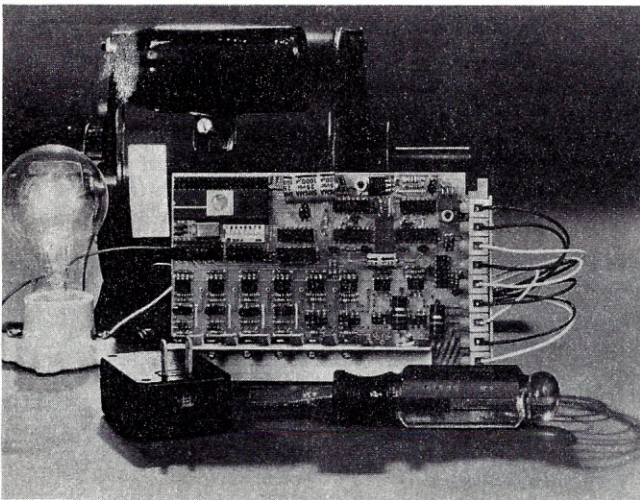
This new single board computer is configured as a remote terminal unit (RTU) for distributed control and remote data acquisition applications. The compact module includes a 6801 microprocessor, eight 12-bit analog in-

puts, eight-bit analog output, eight ac or dc inputs or outputs, serial I/O, watch-dog timer and power supply. The 6801 is programmed with C-net, a communications protocol that allows up to 31 RTUs in a net with one or more master computers. C-net permits the systematic transfer of commands, data and alarms between the masters and RTUs. Priced at \$199.

Wintek Corp., 1801 South St., Lafayette, IN 47904. Reader Service number 487.

### Memory Expansion For HP-9845

Eventide Clockworks Inc., 265 West 54th St., New York, NY 10019, offers a 512K byte memory board for Hewlett-Packard 9845-series microcomputers. The 9845s can accommodate up to three of these boards, providing a random access memory of 1.5 megabytes. A built-in hardware security system uses electronically embedded code which can be read by the proprietary program. If the code is missing or incorrect, the



Wintek's single board computer RTU.

See List of Advertisers on page 210

## INTRODUCING . . . TEACHER'S AID

DR. DALEY'S SOFTWARE is excited about our latest software release—TEACHER'S AID.

TEACHER'S AID is the grade management system you've been waiting for. Its many features mean that you can be free from the drudgery of hours of record keeping and grade reporting. Now you can devote more time to the pleasures of teaching.

TEACHER'S AID is easy to use, menu driven and features—

1. **Flexible class assignment structures.** This means that you can set up and keep records of any combination of homework, quiz, test, lab, etc. scores.
2. **Grade averaging done in a variety of ways.** Grade averages can be prepared using weighted scores, possible scores, tables, percent, or a combination of these methods.
3. **Student progress reports.**
4. **An individualized list of missing assignments.**
5. **Easy editing and additions to any of the files.**
6. **Reports on either the screen or printer.**

All of this power is yours for only \$59.95. TEACHER'S AID comes on disk complete with comprehensive, easy to read documentation, packaged in an attractive binder.


When ordering please tell us your computer configuration. TEACHER'S AID is available on these systems:

Apple II or Apple II Plus  
(32K with single disk)  
Pet or CBM 2000, 3000, or 4000 series  
(16K with 2040 or 4040 disk)

TEACHER'S AID will be ready soon on the Atari 800 and TRS-80 Model I or Model III.

Call or write for details of our other software offerings.

### NOTE OUR NEW ADDRESS

DR. DALEY'S SOFTWARE   
Water Street  
Darby, MT 59829  
Phone: (406) 821-3924  
(Hours: 10 a.m. to 6 p.m. Mountain Time)





## FOR ONLY \$129.95 Learn Computing From The Ground Up

Build a Computer kit that grows with you, and can expand to 64K RAM, Microsoft BASIC, Text Editor/Assembler, Word Processor, Floppy Disks and more.

### EXPLORER/85

Here's the low cost way to learn the fundamentals of computing, the all-important basics you'll need more and more as you advance in computer skills. For just \$129.95 you get the advanced-design Explorer/85 motherboard, with all the features you need to learn how to write and use programs. And it can grow into a system that is a match for any personal computer on the market. Look at these features: 8085 Central Processing Unit, the microprocessor "heart" of the Explorer/85. (Join the millions who will buy and use the 8085/8085 this year alone)... Four 8-bit plus one 6-bit input/output ports from which you can input and output your programs, as well as control external switches, relays, lights, etc. ... a cassette interface that lets you store and reload programs you've learned to write... deluxe 2,000 byte operating system/monitor makes it easy to learn computing in several important ways: • It allows simpler, faster writing and entering of programs • It permits access by you to all parts of the system so you can check on the status of any point in the program • It allows tracing each program step by step, with provision for displaying all the contents of the CPU (registers, flags, etc.) ... and it does much more!

You get all this in the starting level (Level A) of the Explorer/85 for only \$129.95. Incredible! To use, just plug in your 8VDC power supply and terminal or keyboard/display — if you don't have them, see our special offers below.

□ Level A computer kit (Terminal Version) ... \$129.95 plus \$3 P&I\*  
□ Level A kit (Hex Keypad/Display Version) ... \$129.95 plus \$3 P&I\*

**LEVEL B** — This "building block" converts the motherboard into a two-slot \$100 bus (industry standard) computer. Now you can plug in any of the hundreds of \$100 cards available.

□ Level B kit ... \$49.95 plus \$2 P&I\*  
□ \$100 bus connectors (two required) ... \$4.85 each, postpaid.

**LEVEL C** — Add still more computing power, this "building block" mounts directly on the motherboard and expands the \$100 bus to six slots.  
□ Level C kit ... \$39.95 plus \$2 P&I\*  
□ \$100 bus connectors (five required) ... \$4.85 each, postpaid.

**LEVEL D** — When you reach the point in learning that requires more memory, we offer two choices: either add 4k of a memory directly on the motherboard, or add 16k to 64k of memory by means of a single \$100 card, our famous "JAWS".

Level D kit (CHECK ONE): □ 4k on-board ... \$49.95 plus \$2 P&I\* □ 16k \$100 "JAWS" ... \$149.95 plus \$2 P&I\* □ 32k \$100 "JAWS" ... \$199.95 plus \$2 P&I\* □ 48k \$100 "JAWS" ... \$249.95 plus \$2 P&I\* □ 64k \$100 "JAWS" ... \$299.95 plus \$2 P&I\*

**LEVEL E** — An important "building block" it activates the 8k ROM/EPROM space on the motherboard. Now just plug in your 8k Microsoft BASIC or your own custom program.  
□ Level E kit ... \$3.95 plus \$0.8 P&I\*  
□ Microsoft BASIC — It's the language that allows you to talk English to your computer! It is available three ways: □ 8k cassette version of Microsoft BASIC (requires Level B and 12k of RAM minimum; we suggest a 16k \$100 "JAWS" — see above) ... \$64.95 postpaid □ 8k ROM version of Microsoft BASIC (requires Level B and Level E and 4k RAM; just plug into your Level E sockets. We suggest either the 4k Level D RAM expansion or a 16k \$100 "JAWS" ...) ... \$99.95 plus \$2 P&I\* □ Disk version of Microsoft BASIC (requires Level B, 32k of RAM, floppy disk controller, 8" floppy disk drive) ... \$325 postpaid.

**TEXT EDITOR/ASSEMBLER** — The editor/assembler is a software tool (a program) designed to simplify the task of writing programs. As your programs become longer and more complex, the assembler can save you many hours of programming time. This software includes an editor program that enters the programs you write, makes changes, and saves the programs on cassettes. The assembler performs the clerical task of translating symbolic code into the computer-readable object code. The editor/assembler program is available either in cassette or a ROM version.  
□ Editor/Assembler (Cassette version; requires Level B and 8k (min.) of RAM — we suggest 16k "JAWS" — see above) ... \$59.95 plus \$2 P&I\*  
□ Editor/Assembler (ROM version, supplied on an \$100 card; requires Level B and 4k RAM (min.) — we suggest either Level D or 16k "JAWS" ...) ... \$99.95 plus \$2 P&I\*

**8" FLOPPY DISK** — A remarkable "building block." Add our 8" floppy disk when you need faster operation, more convenient program storage, perhaps a business application, and access to the literally thousands of programs and program languages available today. You simply plug them into your Explorer/85 disk system — it accepts all IBM-formatted CP/M programs.  
□ 8" Floppy Disk Drive ... \$499.95 plus \$12 P&I\*  
□ Floppy Controller Card ... \$199.95 plus \$2 P&I\*  
□ Disk Drive Cabinet & Power Supply ... \$69.95 plus \$3 P&I\*  
□ Drive Cables (set up for two drives) ... \$25.00 plus \$1.50 P&I\*

□ CP/M 2.2 Disk Operating System: includes Text Editor/Assembler, dynamic debugger, and other features that give your Explorer/85 access to thousands of existing CP/M-based programs ... \$150.00 postpaid.

**NEED A POWER SUPPLY?** Consider our AP-1. It can supply all the power you need for a fully expanded Explorer/85 (note: disk drives have their own power supply). Plus the AP-1 fits neatly into the attractive Explorer steel cabinet (see below).  
□ AP-1 Power Supply kit (8V @ 5 amps) in deluxe steel cabinet ... \$39.95 plus \$2 P&I\*

**NEED A TERMINAL?** We offer you choices: the least expensive one is our Hex Keypad/Display kit that displays the information on a calculator-type screen. The other choice is our ASCII Keyboard/Computer Terminal kit, that can be used with either



1. Plug in Netronic's Hex Keypad/Display
2. Add Level B to convert to \$100
3. Add 4k RAM
4. Plug in Level E here; accepts Microsoft, BASIC or Editor/Assembler in ROM
5. Add two \$100 boards
6. Add your own custom circuits (prototyping area)
7. Connect terminal

a CRT monitor or a TV set (if you have an RF modulator).

□ Hex Keypad/Display kit ... \$69.95 plus \$2 P&I\*

□ ASCII Keyboard/Computer Terminal kit featuring a full 128 character set, uki case, full cursor control, 75 ohm video output, convertible to baudot output, selectable baud rate, RS 232-C or 20 ma I/O, 32 or 64 character by 16 line format ... \$149.95 plus \$3 P&I\*

□ Steel Cabinet for ASCII Keyboard/Terminal ... \$19.95 plus \$2.50 P&I\*

□ RF Modulator kit (allows you to use your TV set as a monitor) ... \$8.95 postpaid.

□ 12" Video Monitor (10MHz bandwidth) ... \$139.95 plus \$5 P&I\*

□ Deluxe Steel Cabinet for the Explorer/85 ... \$49.95 plus \$3 P&I\*

□ Fan for cabinet ... \$15.00 plus \$1.50 P&I\*

### ORDER A SPECIAL-PRICE EXPLORER/85 PAK — THERE'S ONE FOR EVERY NEED.

□ **Beginner Pak** (Save \$26.00) — You get Level A (Terminal Version) with Monitor Source Listing (\$25 value) AP-1, 5-amp. power supply, Intel 8085 Users Manual ... (Reg. \$199.95) SPECIAL \$169.95 plus \$4 P&I\*

□ **Experimenter Pak** (Save \$53.40) — You get Level A (Hex Keypad/Display Version) with Hex Keypad/Display, Intel 8085 User Manual, Level A Hex Monitor Source Listing, and AP-1, 5-amp. power supply ... (Reg. \$279.95) SPECIAL \$229.95 plus \$6 P&I\*

□ **Special Microsoft BASIC Pak** (Save \$103.00) — You get Level A (Terminal Version), B, D (4k RAM), E, 8k Microsoft in ROM, Intel 8085 User Manual, Level A Monitor Source Listing, and AP-1, 5-amp. power supply ... (Reg. \$439.70) SPECIAL \$339.95 plus \$7 P&I\*

□ **Add a Rom-Version Text Editor/Assembler** (Requires levels B and D or \$100 Memory) ... \$79.95 plus \$2 P&I\*

**Starter 8" Disk System** — Includes Level A, B floppy disk controller, one CDC 8" disk-drive, two-drive cable, two \$100 connectors; just add your own power supplies, cabinets and hardware ... □ (Reg. \$1065.00) SPECIAL \$999.95 plus \$13 P&I\* □ 32k Starter System, \$1045.95 plus \$13 P&I\* □ 48k Starter System, \$1095.95 plus \$13 P&I\* □ 64k Starter System, \$1145.95 plus \$13 P&I\*

□ Add to any of above Explorer steel cabinet, AP-1 five amp. power supply, Level C with two \$100 connectors, disk drive cabinet and power supply, two sub-D connectors for connecting your printer and terminal ... (Reg. \$225.95) SPECIAL \$199.95 plus \$13 P&I\*

□ **Complete 64K System**, Wired & Tested ... \$1650.00 plus \$26 P&I\*

□ **Special! Complete Business Software Pak** (Save \$625.00) — Includes CP/M 2.2 Microsoft BASIC, General Ledger, Accounts Receivable, Accounts Payable, Payroll Package ... (Reg. \$1325) SPECIAL \$699.95 postpaid.

\*P&I stands for "postage & insurance." For Canadian orders, double this amount.

Continental Credit Card Buyers Outside Connecticut:

**TO ORDER**  
Call Toll Free:  
**800-243-7428** KB8

To Order From Connecticut,  
or For Technical Assistance,  
Call (203) 354-9375

CP/M is a reg. trademark of Digital Research

★ (Clip and mail entire ad) ★

SEND ME THE ITEMS CHECKED ABOVE

Total Enclosed (Conn. Residents add sales tax): \$

Paid by:

□ Personal Check □ Cashier's Check/Money Order

□ VISA □ MASTER CARD (Bank No. )

Acct. No. Exp. Date

Signature

Print Name

Address

City

State Zip

user will not be able to run the program.

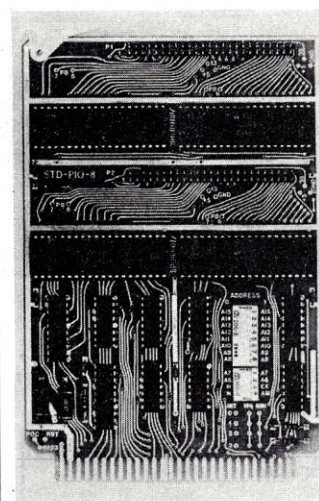
A programmer's utility package ROM can be ordered with the board to enhance programming productivity. It includes XREF, MAP, CHANGE, FIND, DUMP ALPHA and MSI commands. The WMAZ-4 board costs \$6500; the utility ROM is \$700 extra. Reader Service number 492.

### Limited Distance Modem

International Data Sciences, Inc., 7 Wellington Road, Lincoln, RI 02865, has introduced the Model 6200 Limited Distance Modem. The modem is designed for asynchronous operation over private two- and four-wire non-loaded metallic conductors at speeds up to 19,200 bps. It can be used in both point-to-point and multidrop network configurations and is ideally suited for local data distribution up to nine miles. The modem employs a base-band modulation scheme that varies the voltages of the transmit signal on a balanced line, therefore requiring dc continuity. A built-in diagnostic capability helps verify system performance and isolate equipment failures in the communications link. The IDS Model 6200 is priced at \$250. Reader Service number 484.

### STD Bus Board

The STD-VI08 I/O•Timer• Counter Board features eight programmable I/O ports. Each of its 64 I/O lines is individually programmable as an input or output, with 16 programmable handshake lines to permit high-speed data transfers to peripherals. Four 16-bit timers permit wide-range timing (2  $\mu$ s to hours), automatic pulse output to an I/O line, and interrupt-on-time-out capability.



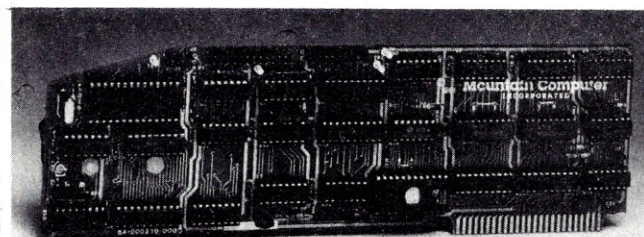
The STD-VI08 Board from Forethought Products.

ities. Four 16-bit event counters monitor incoming I/O signals without CPU intervention. Four programmable shift registers permit serial data to be sent/received, and fully programmable interrupts on all functions avoid the overhead of software polling. Switch-selectable addressing aids system configuration, and 50-pin headers provide dependable connection to I/O devices.

Forethought Products, 87070 Dukhobar Road, Eugene, OR 97402. Reader Service number 495.

### Three Cards in One

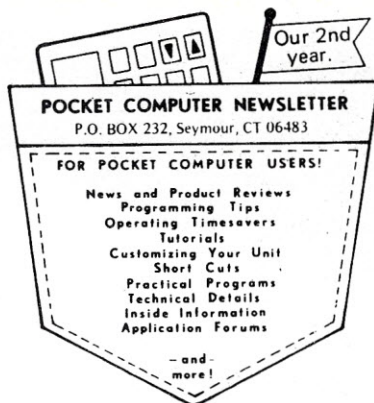
The CPS MultiFunction card from Mountain Computer, Inc., 300 El Pueblo Road, Scotts Valley, CA 95066, provides a serial interface, a parallel output interface and a real-time calendar/clock for your Apple—on one card. Serial and parallel output can be used simultaneously. CPS is configured from a set-up program on disk that sets the parameters for all functions on the card and is stored in CMOS RAM on the card. Parameters can be changed



CPS MultiFunction card from Mountain Computer Inc.

**NETRONICS Research & Development Ltd.**  
333 Litchfield Road, New Milford, CT 06776





**FREE PREMIUM!**  
1982 subscribers will receive the special MATH1 package of PC programs. You qualify to receive this valuable free gift if you check either box 2 or 3 below! Don't delay! Get started learning how to enjoy your pocket computer today. Use this handy subscription card!

### SUBSCRIPTION FORM

- ☐ 1981 Charter Subscriber (Issues 1 - 10). \$20.00 for U.S. delivery. (U.S. \$24.00 to Canada. U.S. \$30.00 elsewhere.)
- ☐ 1981/82 Charter Subscriber (Issues 1 - 20). \$40.00 in U.S. (U.S. \$48.00 to Canada. U.S. \$60.00 elsewhere.)
- ☐ 1982 Regular Subscriber (Issues 11 - 20). \$30.00 in U.S. (U.S. \$36.00 to Canada. U.S. \$45.00 elsewhere.)
- ☐ Sample issue. \$3.00 in U.S. (U.S. \$4.00 elsewhere.)

Orders must be accompanied by payment in full. We do not issue invoices for the POCKET COMPUTER NEWSLETTER.  
Thank you for your remittance. ✓ 146

Name: \_\_\_\_\_  
Addr: \_\_\_\_\_  
City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_  
MC/VISA # \_\_\_\_\_ Expires: \_\_\_\_\_  
Signature: \_\_\_\_\_

# DEALERS... SELL

kilobaud  
**MICROCOMPUTING**

Selling Kilobaud MICROCOMPUTING, the most complete journal of microcomputing, brings the computer enthusiast through your door. Once he's in your store, you can sell him anything.

For information on selling Kilobaud MICROCOMPUTING, call 603-924-7296 and speak with Ginnie Boudrieau, our bulk sales manager, or write to her at Kilobaud Microcomputing, Route 101 and corner of Elm St. Peterborough, NH 03458

Our dealers are telling us that Kilobaud MICROCOMPUTING is the hottest-selling computer magazine on the newsstand, so call today and join the ranks of dealers who make money with KM.

kilobaud  
**MICROCOMPUTING**  
80 PINE STREET PETERBOROUGH NH 03458

# NEVADA COBOL

Edition II of Nevada COBOL, a subset of ANSI-74, features:  
 • Copy statement for library handling.  
 • CALL...USING...CANCEL.  
 • PERFORM...THRU...TIMES...UNTIL...Paragraph or section names.  
 • IF...NEXT SENTENCE...ELSE...NEXT SENTENCE AND/OR <=> NOT.  
 • GO TO...DEPENDENT ON.  
 • Unique easily understood diagnostic error messages.  
 • Interactive ACCEPT/DISPLAY...  
 • RELATIVE (random) access files.  
 • Sequential files both fixed and variable length.  
 • DISPLAY, 16-bit binary or packed decimal (COMP-3) data types with up to 18-digit accuracy.  
 • INSPECT...TALLYING...REPLACING.  
 • ADD, SUBTRACT, MULTIPLY, DIVIDE, GIVING, ROUNDED, ON SIZE ERROR.  
 • Generates optimized 8080 machine language at up to 500 statements per minute.

## \$149<sup>95</sup>

DISKETTE AND MANUAL

• Uses CP/M or MP/M operating system to work with TRS-80, Apple's with softcard, North Star, Superbrain, Micropolis, and many other microcomputers. Needs a minimum of 16K of RAM. Uses single density 8" or 5 1/4" diskette.

**ELLIS COMPUTING**  
SOFTWARE TECHNOLOGY

600 41st Avenue  
San Francisco, CA 94121

CP/M, MP/M and TRS-80 are registered TM's of Digital Research and Tandy Corporation.

WE WELCOME C.O.D.'s

✓ 272

**(415) 751-1522.**

### is HARD COPY STORAGE a problem?

**KILOBAUD MICROCOMPUTING**, as thick as it is, is more like a floppy when it comes to standing on the bookshelf. Try the **KILOBAUD MICROCOMPUTING Library Shelf Boxes**... sturdy corrugated white dirt-resistant cardboard boxes which will keep them from flopping around. We have self-sticking labels for the boxes, too, not only for **KILOBAUD MICROCOMPUTING**, but also for **73 Magazine**, **80 MICROCOMPUTING**... and for **CQ, QST, Ham Radio, Personal Computing, Radio Electronics, Interface Age**, and **Byte**.



Ask for whatever stickers you want with your box order. They hold a full year of **KILOBAUD MICROCOMPUTING**, **80 MICROCOMPUTING**... or **73 Magazine**. Your magazine library is your prime reference; keep it handy and keep it neat with these strong library shelf boxes. One box (BX-1000) is \$2.00, 2-7 boxes (BX-1001) are \$1.50 each, and eight or more boxes (BX-1002) are \$1.25 each. Be sure to specify which labels we should send. Have your credit card handy and call our toll-free order number 800-258-5473, or use the order card in the back of the magazine and mail to:

kilobaud TM  
**MICROCOMPUTING**  
peterborough nh 03458

Att: Book Sales.

Shipping & Handling: \$2.00 per order  
\$10.00 foreign airmail





## Make waves in the German computer market!

★  
Advertise in...  
**CHIP**

The German-language computer market has an exceptional sales potential. CHIP, the leading German magazine for desktop computers will help you to make this market your own. Over 65% of the CHIP readership deals with computers in their business or profession. In addition, the CHIP audience has made computing a hobby for which it is willing to spend money. The German market for personal computing has grown by leaps and bounds since CHIP first appeared in 1978—proven by its paid circulation of 62,913\*. Get yourself into the European market today by advertising in CHIP.

\*IVW Auditing (ABC equivalent), 2nd quarter 1981.

# SAVE \$

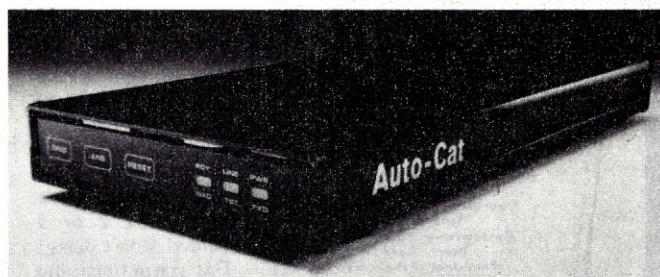
TAKE ADVANTAGE OF THE BEST EXCHANGE RATES IN YEARS!

For further information on advertising, mechanical requirements and closing dates call:

Piergiorgio Saluti  
International Advertising Representative  
603-924-7138



WAYNE GREEN INC.  
Peterborough, N.H. 03458



Novation's new modem automatically answers phone calls.

from the keyboard with control commands. All function setups stored on-board are battery-powered for up to two years. "Phantom slot" capability permits assigning each of the functions of CPS to different slots in your Apple without the card actually being in those slots. CPS's on-board intelligence lets it function in a wide variety of configurations, providing software compatibility with most existing programs. Reader Service number 497.

### Data Communications

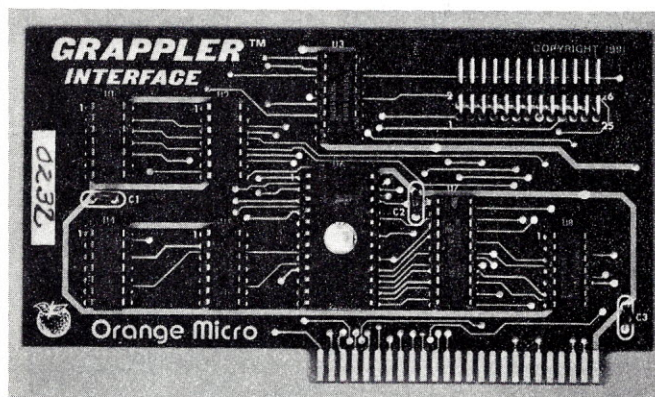
An FCC-approved auto-answer direct-connect modem is offered by Novation, Inc., 18664 Oxnard St., Tarzana, CA 91356. The Bell-103-compatible Auto-Cat will communicate at 300 bits per second (bps) over phone lines, using a standard modular jack. Its three data modes are automatic answer, manual answer and manual originate. It will operate in either full- or half-duplex, and features both local and remote-loopback test functions. The interface between computer and modem is the EIA R-232. This compact modem uses a separate ac power supply that eliminates heat and voltage

hazards. The Auto-Cat will automatically answer calls, permitting unattended operation of personal and business computers and terminals—data can be available 24 hours a day. Priced at \$249. Reader Service number 499.

### Hi-Res Graphics Interface

The Grappler is a Centronics-type parallel interface for the Apple II. It has on-board firmware to copy the Apple high-resolution graphics screen to many popular graphics printers. In the standard mode (for printing charts and graphs) each white dot on the screen is printed as a black dot on the paper. Inverse mode prints the opposite, for printing pictures. The double-size option prints each dot on the graphics screen as four dots on the printer. A chart recorder can be simulated by printing successive and continuous graphics pages. Text commands include text screen dumps, setting of margins and page lengths, auto-skip-over perforation and word wraparound with breakpoint on nearest blank.

Orange Micro, Inc., 3150 E. LaPalma #1, Anaheim, CA 92806. Reader Service number 496.



The Grappler from Orange Micro.



## HOBBY ROBOTICS'

### Shoppers Mart

— For the SERIOUS Hobbyist —





**Complete RU-2 Manual!**  
Everything you need to build your own robot shown, detailed! Build from base up with Hobby Robotics' highly maneuverable 2-ft. per sec. super-traction base, extendable arms lifted at 15 lbs. grip-like hands. Manual only \$25.00, refundable with first purchase.

**HOBBY ROBOTICS' ROBOT BASE**  
Ready to roll!  
**ONLY \$495** (includes shipping)

**HOBBY ROBOTICS** ✓265  
5070-E Buford Highway • Norcross, Ga. 30071 • 404/448-0190

**Hobby Robotics' Parts Supplier Directory.** Chock-full of names, addresses, phone numbers you want for hard-to-find parts, systems, build-your-own-robot info. Only \$3.50. Get yours now!

**HOBBY ROBOTICS**  
5070-E Buford Highway  
Norcross, Ga. 30071 404/448-0190  
Please send items checked below:  
Qrt. Newsletter RU-2 Manual  
Parts Directory Robot Base  
**FREE** Hobby Robotics' Catalog **FREE**  
Total Enclosed \$\_\_\_\_\_ (includes shipping)  
Personal Check Cashiers Check/M.O.  
Mastercharge Bank Americard  
Acct. # \_\_\_\_\_  
Signature \_\_\_\_\_ Exp. \_\_\_\_\_  
Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_  
State \_\_\_\_\_ Zip \_\_\_\_\_

### THE UNIVERSAL ON-LINE REFERENCE WORK

LOOK UP:

- Philip of Macedonia • Current stock prices
- Origins of Indo-European languages
- What's happening in Poland
- Martin Luther's 95 Theses
- Latest developments in Bubble Memory

Starting now, there's no reason to settle for dusty, moldy books as sources of information. Look it up in the Kussmaul Encyclopedia™ instead! Standard system includes:

- TRS80 16K Color Computer
- LEX 11 or Direct Connect Modem
- CTR80A Tape Data Recorder
- Software for games, finance and terminal emulation
- Access to 4 data base systems including The Encyclopedia™ data base.

**ALL for \$895** (Check, VISA, MC or combination). TRS80 is a TM of Radio Shack/LEX 11 is a TM of Lexicon Corp.

"Encyclopedia" is a TM of General Videotex Corp. for its information retrieval system.

**theKUSSMAUL**  
**Encyclopedia™**

A Product of  
General Videotex Corp.  
377 Putnam Ave., Cambridge, MA 02139  
Telephone: (617) 491-3393 ✓392

## SUPER MEMORY SALE



4116-250nS	8/15.95
4116-200nS	8/19.95
4164-200nS	22.50 ea. 8/152.00
2114L	8/19.95
2708 EPROM	3.75
2716 EPROM	6.95
2732 EPROM	17.95
2764 EPROM	67.00
Z6132	24.95

4K x 8 Quasi-Static RAM

**SPECIAL ORDER LINE**  
**1-800-521-0664**

Write for Our Full Line Catalog

**WESTLAND ELECTRONICS**  
37387 Ford Rd.  
Westland, MI 48185 ✓45

### CHEAP CHIPS . . . ARE NO BARGAIN

### BUYING ADD-ON MEMORY? GET THE BEST!!!

Memory failures cost you time and money. Japanese 16K RAM chips have a one-to-ten in-service failure ratio to U.S. chips—from a study by R. Anderson, Computer Div., Hewlett-Packard, reported in *The Economist*, 4-26-80.

We offer 4116 chips by Fujitsu, NEC, Hitachi, Toshiba and Mitsubishi . . . for most popular computers and expansion memory boards, including:

\*Apple \*All TRS-80's \*New Pot \*Heath H-89  
\*Superbrain \*Expandrom \*Many Others

<b>4116 DYNAMIC RAMS</b>	<b>THE BEST</b>
200nsec Plastic	\$27.70, Ceramic \$37.95
150nsec Plastic	\$31.95, Ceramic \$41.95

**STATIC RAMS**

2114 450nsec	\$3.30, 300nsec \$3.90; 2101 \$2.90.
--------------	--------------------------------------

**EPROMS** (450 nsec std; ask for hi-speed if required)

2708 \$4.80; 2716 5V+12V	\$9.40; 2716 5V \$9.70;
2732	\$18.90.

We'll beat any legitimate price for comparable chips. Hi-volume users, dealers, or clubs, ask for quantity discounts.

SHIPPING: to \$25, \$2; to \$50, \$1; over \$50, FREE.  
COD: +\$1.40.

DISCOUNTS ON TOTAL: over \$100, 5%; over \$200, 10%.

**MINIS & MICROS INC. • 29486 Trailway**  
Agoura, CA. 91301 • (213) 342-4535 ✓391  
CA. residents add 6% sales tax

2 YEAR WARRANTY ★ CALL US ANYTIME

TOP QUALITY CHIPS AT UNBEATABLE PRICES

### IS YOUR North Star OUT OF SORTS?

### INCREASE YOUR BASIC'S SORTING POWER OVER 1800%!

N\*SORT is easy to use and will perform sorts on one and two dimensional or string arrays using optional sort keys. For example, to alphabetize A\$:

10 A\$ = "ZYXWVUTS" \ REM Define String  
20 SRT A\$.LEN(A\$),1 \ REM Sort A\$

N\*SORT interfaces to any release 4 or later North Star Basic and can be yours for **ONLY \$89** plus \$1.50 shipping

Calif. Res. add 6% tax.  
Send check VISA or M/C  
Complete Brochure Available

✓111  
**SZ Software Systems**

1269 Rubio Vista Road, Altadena, Calif. 91001  
(213) 791-3202

## fullFORTH+ for APPLE/PET

Full implementation of FIG FORTH PLUS

6502 CONDITIONAL ASSEMBLER  
INTEGER OR FLOATING POINT ARITHMETIC  
STRING MANIPULATION WORDS  
IF-DO (A form of CASE statement)  
CURSOR CONTROL SCREEN EDITOR  
SINGLE AND MULTI-DIMENSIONAL ARRAYS  
DISK VIRTUAL MEMORY  
ADDITIONAL UTILITIES INCLUDING:  
SCREEN TO SCREEN COPY  
CORE DUMP  
PRINTER CONTROL WORDS  
FORTH WORD DECOMPILER  
TARGET COMPILER NOW AVAILABLE  
COMPLETE DOCUMENTATION INCLUDES:  
INSTALLATION GUIDE (8 PAGES)  
GETTING STARTED (TUTORIAL)  
(28 PAGES)  
USERS GUIDE (86 PAGES)

Purchasers receive 1 year subscription to the fullFORTH+ Newsletter (Published bi-monthly)

Price \$75.00 — foreign \$85.00 (Add \$2.50 shipping)  
(PA residents add 6% sales tax)

**IDPC CO. — Box 11594, Phila., Pa. 19116**  
✓279 or call — (215) 676-3235

kilobaud

## MICROCOMPUTING BINDERS



### order yours today

Keep your library of Microcomputing safe from loss or damage in these handsomely appointed binders with rich dark blue covers and gold lettering. Each binder holds 12 issues making an EXCELLENT REFERENCE HANDBOOK. Several binders form a quality library you can be proud of. Please state years 1977-82

\$7.50 each . . . 3 for \$21.75 . . . 6 for \$42.00  
Postage paid in USA. Foreign orders please include \$2.50 for postage.

Send check or money order only to:  
**KILOBAUD MICROCOMPUTING BINDERS**  
P.O. Box 5120, Phila., PA 19141

Allow 6-8 weeks for delivery. Please no C.O.D. orders, no phone orders.

## No. 5 UNBELIEVABLE OPPORTUNITY!

If You've Written  
State-of-the-Art Software--  
We'd Like to Publish It!

We're looking for **SYSTEM** soft

**DISK OPERATING SYSTEMS**  
**MONITORS**  
**PROGRAMMER AIDS/UTILITIES**  
**LANGUAGES**  
**DATA BASE SYSTEMS**

Then, sit back and collect your royalty checks. Write for our free **Programmer's Kit** today!

**INSTANT SOFTWARE, INC.** ✓75  
**Submissions Dept.**  
**Peterborough, NH 03458**

## No. 6 UNBELIEVABLE OPPORTUNITY!

If You've Written  
a Useful Program--  
We'd Like to Publish It!

We want programs for **INDUSTRIAL** applications:

**JOB COST ESTIMATES**  
**INDUSTRIAL (PROCESS) CONTROL**  
**JOB TRACKING**  
**MACHINE SCHEDULING**

Get published and earn royalties!  
Write for our free **Programmer's Kit** today.

**INSTANT SOFTWARE, INC.** ✓75  
**Submissions Dept.**  
**Peterborough, NH 03458**



# CLUB NOTES

## Portland Computer Society

The Portland Computer Society meets the third Saturday of each month at the Far West Federal Savings Community Meeting Room, 4770 SW 76, Portland, OR (503-292-4412).

## Connecticut CP/M User's Group

The purpose of the Connecticut CP/M user's group is to bring CP/M users together to discuss CP/M-based hardware and software. The group meets the last Monday of each month. For more information

contact The Wordsmith Network, 110 Day Hill Rd., Windsor, CT 06095 (203-683-2427).

## Heath User's Group

Heathkit hobbyists have formed a local Heath user's group in Charlotte, NC. For details on the monthly meetings, contact Jim Simpson, HUG Charlotte, 2721 Picardy Place, Charlotte, NC (704-374-6997 or 375-1581).

## OSI User's Group

The OSI user's group of southern Ontario will meet December 5, 1981, at McMaster University, Hamilton, On-

tario. For further information contact Dr. N. Solntseff or Mr. C. Bryce, Unit for Computer Science, McMaster University, Hamilton, Ontario L8S 4K1 (416-525-9140 ext. 4689 or 2065).

## South Florida User's Groups

The Ft. Lauderdale section of the South Florida Computer Group meets at the Social Annex, Holiday Park, Ft. Lauderdale, FL, the second Monday of each month at 8 PM. For more information contact Bob Haskins, 305-922-0955.

The Miami section meets the third Tuesday of each month at 8 PM at 240 NW 203 Terrace, Miami, FL. For further information contact Jerry Lofstead, 305-653-0669.

## IBM Personal Computer User's Group

The Philadelphia Area IBM Personal Computer User's Group is being formed to stim-

ulate communication among its members and members of other IBM microcomputer user's groups. A monthly newsletter will be published and group activities will be sponsored. Interested persons should contact Craig W. Uthe, 4101 Spruce St., Apt. 311, Philadelphia, PA 19104 (215-387-8208).

## Osborne User's Group

The Osborne Business Software User's Group was recently formed to promote the use of Osborne/McGraw-Hill software. Membership in the group costs \$10 a year and includes a subscription to the group newsletter, bug reports/fixes and access to additional compatible business software on eight-inch disks.

For further information contact John G. Ellis, Osborne Business Software User's Group, 2256 Main St., Suite 11, Olaty, CA 92011 (714-423-0538).

# CLASSIFIEDS

Classified advertisements are intended for use by persons desiring to buy, sell or trade used computer equipment. No commercial ads are accepted.

Two sizes of ads are available. The \$5 box allows up to 5 lines of about 35 characters per line, including spaces and punctuation. The \$10 box allows up to 10 lines. Minimize use of capital letters to save space. No special layouts allowed. Payment is required in advance with ad copy. We cannot bill or accept credit.

Advertising text and payment must reach us 60 days in advance of publication (i.e., copy for March issue, mailed in February, must be here by Jan. 1). The publisher reserves the right to refuse questionable or inapplicable advertisements. Mail copy with payment to: **Classifieds, Kilobaud Microcomputing, Peterborough, NH 03458.** Do not include any other material with your ad as it may be delayed.

For Sale: I have over supply of new diskettes and other computer supplies. Too many to list here. SASE G. R. Davis, 16 W. Walnut Ave., Westmont, NJ 08108.

For Sale: Centronics 730 printer, same as Radio Shack Lineprinter II. New, only tested. Extra ribbons. \$600. UPS COD. Dingley, 417 Liberty, Painesville, OH 44077. 216-354-5759.

For sale: insurance agency package. Univair package in CBASIC, list \$750—selling for \$600. D. P. Apt, 25102 Friar Lane, Southfield, MI 48034.

Word processing typewriter by Redactron. 15-inch model 745 I/O Selectric plus dual digital cassette drives. Can record, play back, edit, reformat, search tapes, merge text from one drive with addresses from other, etc. Excellent condition; recently factory overhauled. Operator's manual plus partial schematics included. \$600 plus shipping. Bob Levine, 32 King St., New York, NY 10014. 212-691-2897.

For sale or trade: One RCA VIP microcomputer with 4K RAM, cassette I/O, hex keypad and graphics; with RF modulator included. Worth \$199 new; sell for \$135 US. Also have a Licon hall effect, 88-key keyboard with parallel ASCII converter. \$90 new; sell for \$80 US or best offer. Manuals included for both items. I will trade both for a HP-41C with manuals in good condition. Steve Gutz, RR#3, Pembroke, Ontario, Canada K1A 6W4.

Soft Sector Software: Electrical and audio engineering software for PET and Apple. Extensive graphics and printout capabilities. R. Majef, 534 Apollo, Richardson, TX 75081.

For sale: CT64 terminal \$130, digital cassette drive \$30, WW 6800 CPU brd (4K PROM w/listing, 2 PIA, 2 ACIA, 1K RAM) \$30. John Aggers, 15742 Heywood Way, Apple Valley, MN 55124. 612-432-4483.

For sale: DEC VT103AA terminal, LSI-11/2, 96K memory 1 Megabyte dual floppy disk drive—RX02, RT11 Op. Sys. KED Text Editor, complete system, like new \$8600. Howard C. Cooper, 630 N. 200 E., Kaysville, UT 84037. 801-766-1071 or 801-526-2601.

For sale: North Star Horizon 2. Includes two 5-inch double density disks, 48K RAM, sound gen. board, software, documentation and Hazeltine 1500 24x80 super terminal. Complete system: \$2900. Duane Brummel, Rt. 2, Brooklyn, WI 53521. 608-835-7554.

For sale: ASR 33 teletype with stand and manuals. Excellent condition. \$250 plus shipping. John Dobiac, 101 S. Fox Rd., Sterling, VA 22170. 703-430-6950 after 6 PM.

For sale: 2114L2 memory chips, new—never used. All or part, \$2.65 each. R. Van Cleave, 256 S. Tucson Circle, Aurora, CO 80012. 303-340-2955.

For sale: Diablo 1640KSR daisywheel printers, one new and one used, \$2150 and \$1950. TRS-80 printer III, used, \$1200. San Jose, CA, call Chris 415-494-4557.

# MICRO QUIZ

(from page 23)

**Answer:** 1, 2, 4, 5 and 3.

Array A has values 5, 3, 4, 2, 1.

Array R has values 3, 5, 2, 4, 1.

$R(A(1)) = R(5) = 1$

$R(A(2)) = R(3) = 2$

$R(A(3)) = R(4) = 4$

$R(A(4)) = R(2) = 5$

$R(A(5)) = R(1) = 3$



"That new blouse you wanted will have to wait, Dear; this subscription to *Kilobaud Microcomputing* is much more important."



# DEALER DIRECTORY

## El Monte, CA

Ohio Scientific specialist in the San Gabriel Valley serving greater Los Angeles. Full product line on display. Specializing in business computers. In-house service. Custom programming. Terminals. Printers. Open Mon-Sat, 9 AM-7 PM. **Computer & Video, 3380 Flair Dr., Suite 207, El Monte, CA 91731. 572-7292.**

## N. Hollywood, CA

Wholesale prices to dealers & computer club members! Anadex, Centronics, Corvus, Delta, Diablo, Epson, Godbout, Hayes, IDS, C. Itoh, Micro Pro, Mountain Computer, NEC, Novation, Okidata, Qume, TI, Teletype, Vector Graphic, Vista, Zenith & others. **Patio Computer Sales Co., Suite 204, 5451 Laurel Canyon Blvd., N. Hollywood, CA 91607. 762-0020.**

## Riverside, CA

Visit our Computer Support Center for the Inland Empire's largest selection of ICs, books and computer accessories. Open daily. Check our prices and friendly service. **Inland Electro-Mart, 8624 California Ave., Riverside, CA 92504. 687-3776.**

## San Jose, CA

New and used computer products—specializing in S-100 boards, printers, drives, chasses and complete systems, as well as supplies and parts—Imjai, Tandon, Diablo—5000 sq. ft. **W/W Component Supply, Inc., 1771 Junction Ave., San Jose, CA 95112.**

## San Jose, CA

Bay area's newest computer software store. Featuring Instant Software for the TRS-80, Apple, magazines, books. **Shaver Radio, 1378 S. Bascom Ave., San Jose, CA 95128. 998-1103.**

## Gainesville, FL

Florida's most knowledgeable computer dealer. Apple computer (and S-100) sales and service. Peripherals, books, magazines, software, classes, consulting, supplies and engineering. **Computer System Resources, Inc., 3222 SW 35th Blvd., Gainesville, FL 32608. 376-4276.**

## Melbourne, FL

Sales, service and leasing for Apple, SD systems, Altos, Atari, Mountain Computer, Intersystems, Epson, Anadex and Paper Tiger. Software, books, and magazines. Systems consulting. Mail order. **H.I.S. Computerization, Inc., 1295 Cypress Ave., Melbourne, FL. 254-9399.**

## Nokomis, FL

We are the leading area computer store. We carry Cromemco, Apple, Vector Graphic; printers & terminals. We offer full software support including G/L, A/R, payroll & word processing. **Computer Centre, 909 S. Tamiami Trail, Nokomis, FL 33555. 484-1028.**

## Sarasota, FL

Your personal and business computer store for Dynabyte, Vector, HP-85, Atari and Epson. Structured Systems and Micro-Pro software. Computer furniture and books by Osborne or Hayden. Sales, service and supplies. **Computer Crossroads, 3800 S. Tamiami Trail, Sarasota, FL 33579. 349-0200.**

## Aurora, IL

Microcomputer systems for home or business; peripherals, software, books & magazines. Apple, Hewlett-Packard Series 80 Systems, HP Calculators, IDS, Qume, Starwriter printers. **Farnsworth Computer Center, 1891 N. Farnsworth Ave., Aurora, IL 60505. 851-3888.**

## Herington, KS

Hardware support. Maintenance and service for all microcomputers and peripherals. Kits assembled or debugged. Radio Shack (mods OK) repaired. Quality work, fast turnaround and reasonable cost. **Prairie Micro Clinic, Box 325, Herington, KS 67449. 258-2179.**

## Pasadena, MD

Altos, Apple, Osborne, Atari—systems, software, service. Not just another computer store! We're a full-service problem solving center for small businesses. **Computer Crossroads, Inc., 9143G Red Branch Rd., Columbia, MD; 8220 Ritchie Hwy., Pasadena, MD. 730-5513/647-7111.**

## Garden City, MI

Books, magazines, hardware and software for Apple, North Star, TRS-80 and PET. **Computer Center, 28251 Ford Rd., Garden City, MI 48135. 425-2470.**

## Lodi, NJ

Computer hardware: North Star, Zenith, Atari, CBM/PET, Qume, Epson and others. Software: EduWare, Professional Software, Zenith, North Star, Programma, Personal Software and others. Factory trained service dept. Books, magazines, etc. Full product line on display. **Comtek Electronics, Inc., Rt. 46 West, Lodi, NJ. 472-2440.**

## River Edge, NJ

Discount software—up to 25% off business, utility, recreational, educational and home programs. Apple, Atari, TRS-80 and PET. Atari computers always on sale. **Software City, 111 Grand Ave., River Edge, NJ 07661.**

## Chautauqua, NY

Retail book store featuring the Disassembled Handbook for TRS-80 Volumes 1, 2, 3. English, German & French language editions. 9 AM-5 PM weekdays. Come and visit us. **Richcraft Computer Book Store, 1 Wahmeda Ave., Chautauqua, NY 14722. 753-2654.**

## Rome, NY

New and experienced computers, printers, modems. Software exchange. VHS video equip., blank tapes, rated movies. List includes (send SASE): PET, SSB, TRS-80, SWTP, Panasonic, VCX. **Video Computer Center, Box 1285-408, W. Liberty St., Rome, NY 13440. 336-0266.**

## Staten Island, Brooklyn, NY

Computer hardware: North Star, Zenith, Atari, CBM-PET, Qume, Epson and others. Software: EduWare, Professional Software, Zenith, North Star, Programma, Personal Software and others. Factory trained service department. Books, magazines, etc. Full product line on display. **Comtek Electronics Inc., Staten Island Mall, Staten Island, NY. 698-7050; Coney Island Ave. and Ave. X, Brooklyn, NY. 332-5933.**

## Mississauga, Ontario

I.D.S. brings Digital Research's Big Board into Canada. Bare boards, kits, or fully assembled single board computers plus many CP/M based business and utility software. **Inno-tech Digital Systems, 50 Elm Drive East, Suite 1804, Mississauga, Ontario, L5A 3X2, Canada. 277-2222.**

## Portland, OR

Ohio Scientific specialists for business and personal computers. Local service. Terminals, printers, custom programming. Full OSI product line on display! 10 AM to 6 PM M-F. **Fial Computer, 11266 SE 21st Ave., Milwaukie, OR 97222. 654-9574.**

## Montreal, Quebec

We do expert service on all microcomputers and peripherals, (CRT, printer, floppy disk) North Star, Hazeltine, Cromemco, Centronics, Shugart, Siemens, Apple, TRS, Epson, S-100. **Montreal Data Centre, 120 Ricard, Legardeur, Montreal, Quebec. 585-8801.**

## Alexandria, VA

Full service center for Heath/Zenith computer products. Hardware, software on display and available off the shelf. Call or come by for a personalized demonstration. **Heathkit Electronic Center, 6201 Richmond Highway, Alexandria, VA 22303. 765-5515.**

## Woodbridge, VA

Computer/word-processing systems for business, school, home. Software, disk drives, printers. Books, magazines, supplies. Authorized CBM/PET dealer, service. Consulting, training, maintenance contracts. MWF noon-8 PM, Saturday 9 AM-3 PM. **Virginia Micro Systems, Inc., 14415 Jefferson Davis Highway, Woodbridge, VA 22191. 491-6502, Washington Metro 643-1063.**

## Spokane, WA

SS-50 Users: Expand present system to maximum or build from ground up. We provide PCBs for motherboards, interfaces, etc. Write for specs and information. **Quality Research Company, PO Box 7207, Spokane, WA 99207.**

**Dealers:** Listings are \$15 per month in prepaid quarterly payments, or one yearly payment of \$150, also prepaid. Ads include 25 words describing your products and services plus your company name, address and phone. (No area codes or merchandise prices, please.) Call Marcia at 603-924-7138 or write Kilobaud Microcomputing, Ad Department, Peterborough, NH 03458.



## Real Estate Software Apple Business Accounting CBASIC-2 Screen Handler H8 Speed-up

### Real Estate Office Management

A CP/M software package that provides accounting and management information for real estate brokerage firms is available from Reality Automation, Inc., 221 North Lois, La Habra, CA 90631. It can handle one or more offices with one or more profit centers. The system includes a general ledger with profit and loss statements, balance sheets, trial balances and transaction registers. A chart of accounts developed by the National Association of Realtors is included, although the user can modify it or install his/her own chart of accounts.

The system permits office or division budgeting, and monthly, year-to-date and operating statement comparisons. Future cash flow estimates can be projected through the year-to-date budget. Accounts payable includes a checkwriter. A check can be entered once and will print monthly checks until removed. Price is \$350. Reader Service number 464.

### Apple Tree

First Edition is a computer conferencing package with general database and electronic mail features. Users enter messages and retrieve them via regular phone lines using a 48K Apple computer or terminal, disk drive and modem. Each new message is attached to others already in the database, allowing users to organize a conference tree of messages—any one of which can grow into a new conference or subconference. This tree structure makes it

easier to find specific information and to enter information in the most appropriate part of the database.

Messages can be private or public. Seven different levels of password protection operate on the same system. Passwords are easy to change. Price is \$95 with documentation.

Communitree Group, 470 Castro St., Suite 207-3002, San Francisco, CA 94114. Reader Service number 466.

### Business Accounting For the Apple

The GOCI Business Accounting package performs all accounting functions for general business applications. The package consists of nine interactive modules: General Ledger, A/R, A/P, Order Processing, Inventory Control, Fixed Assets, Payroll, Disbursements and Banking. It keeps up to 7500 inventory items up-to-date, issues POs and BOs, physical count lists with

or without quantities, mark-up and profit data, returned goods memos and up to 900 services. It handles up to 2500 receivables, with selective customer service charges, variable discounts on any item, credit checking, automatic monthly billing, sales territory control and referral code. It allows for 2500 payables, and monitors cash requirements to vendors. All modules post automatically to the G/L using standard accounting practices with audit trails provided. Price is \$1500.

GOCI Software, 9524 Briar Road, Bloomington, MN 55437. Reader Service number 470.

### Data Security

An operating system for multi-user computer networks, offered by Digital Research, PO Box 579, Pacific Grove, CA 93950, features record and file locking and optional password protection. MP/M II can manage up to 400K

bytes of random access memory. It includes utilities previously available only as options, such as a relocatable macroassembler, a linker with overlay facilities and a program library management utility. MP/M files are completely compatible with CP/M files. MP/M II comes on standard-format IBM single-density 8-inch floppy disk, priced at \$450. Reader Service number 474.

### CBASIC-2 Screen Handler

Screenmaster is a screen-handler module provided in source code for inclusion in CBASIC-2 programs requiring full-screen or multi-screen input with automatic validation. The programmer has access before and after each input, and at submit time. CBASIC-2 code can be inserted to edit or control the program, overriding Screenmaster editing if necessary. The programmer and, optionally, the terminal user, have commands: GOTO (field) n, BACK/FORWARD n (fields), NEXT/PRIOR (screen), SUBMIT and ABORT. The output of Screenmaster is an in-memory array of user responses for further use by the programmer. Price is \$195.

Marketing Essentials, Inc., 161 West 75th St., New York, NY 10023. Reader Service number 471.

### Flexible Operating System

PCD Systems, Inc., PO Box 143, Penn Yan, NY 14527, is now offering the UCSD P-system version IV.0 operating system, which lets users run applications programs written



MP/M II is a multi-user, multitasking operating system from Digital Research.



for one microcomputer on another—often without recompilation. The version IV.0 features the same operating system and utilities for a number of microprocessors, including the 8080, 8085, Z-8, Z-80, 6502, 6800, 6809 and the range of new 16-bit micros. It is fully supported to run on the TRS-80 Model II and Digital Equipment Corporation's LSI-11. The package includes the complete operating system for microcomputers (with the user's choice of Pascal, BASIC and FORTRAN compilers), a file handler, interpreter, screen and character editors, a macro assembler, linker and documentation. Price is \$550 for FORTRAN or Pascal compilers, \$450 for BASIC. Reader Service number 468.

### An Adventure on the Apple

Muse Software, 330 N. Charles St., Baltimore, MD 21201, has introduced Castle Wolfenstein. This action-adventure game puts the player in the role of an Allied soldier in World War II. The castle itself is a magnificent Old World fortress occupied by the army of the Reich and converted into battlefield headquarters. The player, who has been captured and brought to Castle Wolfenstein for interrogation, is secretly slipped a loaded pistol by a dying cellmate. The player then assumes the game challenge: to find the Nazi war plans hidden in the castle and to escape.

The castle requires fast

thinking and quick manual response. Castle Wolfenstein runs on an Apple II with 48K bytes of memory and one disk drive. Price is \$29.95. Reader Service number 480.

### Speed Up Your H8 Programs

Interactive Microware, Inc., PO Box 771, State College, PA 16801, offers their BASEX interactive compiler and loader programs on cassette for Heath H8 microcomputers. BASEX is an intermediate-level language that combines features of BASIC and executable machine-language code. BASEX programs run up to 10 times faster than similar BASIC programs, and program overhead is only 2K bytes for the execution routines. Price is \$33. Reader Service number 465.

### Solar Hot Water Program

Sunheat1 can plan and evaluate a variety of solar hot water systems. It will estimate the amount of energy available with different types of solar collectors and heat exchangers and different pre-heat and hot-water tank sizes. Sunheat1 can also be used to find the optimum tilt angle for the collector, the best type of collector and best heat transfer fluid. The program is customized for each user's specific location, with average temperature, cloudiness and available solar energy data. Typi-



You'll need quick thinking and good reflexes to meet the challenge of Castle Wolfenstein.

## SPECIAL DELIVERY

### WORDPROCESSING - POWER - for the TRS-80®

"...If you're presently looking for a mailing list processor, this represents the current state of the art."  
80 MICROCOMPUTING - 80 REVIEWS - JULY 1980

**MAILFORM** is data entry at its best, just fill in the form! **FAST, EASY** to use functions include: search, sort, extract, page forward and back. 'Transparent cursor', insert/delete characters, and **MORE!**

**MAILRITE** prints 'personalized' form letters by inserting information from **MAILFORM** into Electric Pencil®, Scripsit®, or BASIC text files. Print letters, labels, even envelopes! Boldface, underscore, change margins, pause, print 'unprintable' characters, and **MORE!**

**XTRA!** includes: **MAILFORM**; **MAILRITE** - with capability of printing variable text from a 'key' file; **MAILABEL** - 1, 2, 3, or 4 across label printer; and **MAILSORT** - sort a full 40 track double density data diskette in only 48K!

### ALL MACHINE LANGUAGE means unsurpassed SPEED, RELIABILITY & EASE OF USE

For VISA, Master Card & COD orders only  
**Call NOW - TOLLFREE**  
**(800) 824-7888**

**ASK FOR OPERATOR 203**

California (800) 852-7777

Hawaii & Alaska (800) 824-7919

For more information call (214) 233-3998

(Requires min 32K single disk drive)

**FOR THE MODEL I & III**  
**SPECIAL DELIVERY .....\$125**  
**XTRA SPECIAL DELIVERY ..\$199**

**FOR THE MODEL II**  
**SPECIAL DELIVERY .....\$199**  
(Requires Mod II DOS version 2.0)

TRS-80 is a registered trademark of Tandy Corp.



**software concepts**

13534 Preston Rd. Suite 142  
Dallas, Texas 75240

Dealer Inquiries invited



## L&J S-100 SYSTEM POWER SUPPLY

Will accommodate a 12 Slot Mainframe & Two 8" or 5 1/4" Drives

### REGULATED OUTPUTS

+5V, 4A (OVPI)  
-5V, 1A  
+12V, 4A (or 24v specify)

Model..... P6

Assembled & Tested..... \$99.95

Size... 6"x10"x5"

ALL outputs fused

### UNREGULATED OUTPUTS

+8V, 14A

+16V, 3A

-16V, 3A

# S-100 SYSTEM POWER SUPPLY

L&J

PO BOX 975  
Sedalia, Missouri 65301  
[816]826-1994

Add \$7.50 Shipping & Handling  
Missouri residents add \$4.62  
sales tax. (Per unit)

## START YOUR OWN COMPUTER CO.

We have the manuals that tell you how.

### HOW TO START YOUR OWN SYSTEMS HOUSE

6th edition, March 1980

\$36.

Written by the founder of a successful systems house, this fact-filled 220-page manual covers virtually all aspects of starting and operating a small systems company. It is abundant with useful, real-life samples: contracts, proposals, agreements and a complete business plan are included in full, and may be used immediately by the reader.

Proven, field-tested solutions to the many problems facing the small systems house are presented.

### HOW TO BECOME A SUCCESSFUL COMPUTER CONSULTANT

by Leslie Nelson, 2nd revised edition, Jan. 1981

\$28.

Independent consultants are becoming a vitally important factor in the microcomputer field, filling the gap between the computer vendors and commercial/industrial users. The rewards of the consultant can be high: freedom, more satisfying work and doubled or tripled income. **HOW TO BECOME A SUCCESSFUL COMPUTER CONSULTANT** provides comprehensive background information and step-by-step directions for those interested to explore this lucrative field.

### FREE-LANCE SOFTWARE MARKETING

by B. J. Korites, 3rd edition, June 1980

\$30.

Writing and selling computer programs as an independent is a business where • you can get started quickly, with little capital investment • you can do it full time or part time • the potential profits are almost limitless. Since the demand for computer software of all kinds is growing at an explosive rate, the conditions for the small entrepreneur are outstanding.

Send check, money order, VISA or Master Charge #. Publisher pays 4th class shipping. Add \$1.00 per book for UPS shipping. For faster shipment on credit card orders call (201) 783-6940.

ESSEX PUBLISHING CO. Dept. 1  
285 Bloomfield Avenue • Caldwell, N.J. 07006

✓ 327

cal hot water use can be selected, or users can enter their own values. Sunheat1 is available for either the TRS-80 Model I Level II or the Apple II+, on disk or cassette. Price is \$19.

Solartek, PO Box 298, Guilderland, NY 12084. Reader Service number 469.

## Medical Package for The Apple

Medical Office Management II is designed to manage the physician's appointments, private patient billing, third party claim form preparation, diagnostic and treatment records, patient report preparation, mailing lists, referral letters and general word processing.

The insurance claim system prepares the universal claim form on a daily, weekly or monthly basis. The medical records element allows for the entry and organization of family or individual medical records with provision for selective printing or terminal display. Doctors can use the system to search for similar symptoms or diagnoses, or program the system to search for drug conflicts. Single-system license is \$959.95. The appointment, private patient billing and claim form preparation elements are available separately for \$449.95.

Charles Mann & Associates, 7594 San Remo Trail, Yucca Valley, CA 92284. Reader Service number 473.

## Sophisticated Apple Analysis

SMART is a comprehensive, integrated system for institutional money managers and sophisticated investors. The system provides capabilities for retrieving, storing, graphing and analyzing securities and economic data. A portfolio module maintains and reports data and transactions for securities portfolios. Users of the system can automatically access data from one or more remote databases and prepare graphics displays in various formats. Graphing options include open-high-low-close charts, volume histograms, line charts and point plots. Graphs can be full-screen or independent split windows.

Analytic tools include moving averages, exponential smoothing, momentum, trend lines and user-defined formulas. System requirements include a 48K Apple II+ computer, two disk drives, modem, monitor and printer.

Software Resources, Inc., 186 Alewife Brook Parkway, Suite 310, Cambridge, MA 02138. Reader Service number 479.

## Financial Modeling System

Plan80 is a modeling system for microcomputers that interactively produces bar charts and line graphs or tables to let the user project sales, analyze cash flow and build budgets. The user enters row and column definitions, data assumptions and calculation statements using any familiar editor or word processor. Assumptions can be changed interactively and the results recalculated at any time. Any part of one model can be incorporated into another. The user can compute functions such as depreciation, present value and internal rate of return. Plan80 is available for Apple, CP/M and UCSD systems. Price is \$295.

Business Planning Systems, 2 North State St., Dover, DE 19901. Reader Service number 472.

## Troubleshooting North Star

Software tools that aid in the diagnosis of North Star hardware and/or software problems are available from Valley Forge Software Group, 406 West DeKalb Pike, King of Prussia, PA 19406. Included are a full memory test (with Grey codes) and other stepped cycles to help isolate transient memory failure. A disk exerciser aids in alignment tests and functional operation testing. A serial port testing routine checks operation of ports set up in a loop-back configuration. The most powerful tool is the on-line, interrupt-driven software-debugging system. This module provides review and modification of memory, hardware registers and hardware ports, with multiple breakpoint addresses. The de-



bugger resides in memory with the North Star DOS and is capable of single-step execution of any 8080-based code. License per computer is \$75. Reader Service number 476.

### Disk Speed Measurement for the TRS-80

RPM measures the rotational speed and variation of disk drives on the TRS-80 Models I and III. Rotational speed errors are a common cause of problems, and variations in speed can cause intermittent, hard-to-detect errors. Readouts are given in real time as numbers, percents, words and graphs. RPM automatically shows speed ranges, and can recover from severe errors without a system reset. Price is \$24.95.

Prosoft, Box 839, North Hollywood, CA 91603. Reader Service number 475.

### Hands-On Learning

Block Shapes for Applesoft or Assembly contains programs to create and animate all types of shapes, such as vector shapes, block shapes, HPLOT shapes, text file shapes, data array shapes, and so on. This package is designed to help you learn more about graphics as you explore its possibilities. Most animation routines are in machine language, and the source codes for these routines are included. All source-code files are thoroughly explained and unprotected, and the machine-language routines are also unprotected. Cost is \$99.95, on disks with documentation.

Avant-Garde Creations, PO Box 30160, Eugene, OR 97403. Reader Service number 477.

### Word Processing Utility for Sorcerer

Roger Hagan Associates, 1019 Belmont Place East, Seattle, WA 98102, has released a utility program for use with the Exidy Sorcerer Word Processing System. WSORT is a high-speed Z-80 sorting routine. The sort is menu-driven, and it offers a

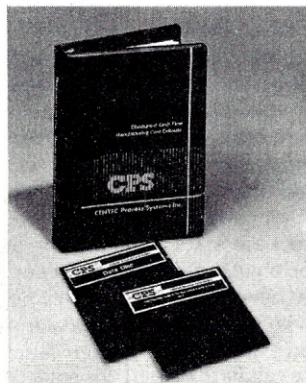
choice of sort parameters. Any part or all of a file in memory can be sorted. WSORT turns the Exidy Word Processor Pac into a fast and convenient mailing list, bibliography, abstract, client file or other database management system. The program, with manual, costs \$47.50. Reader Service number 478.

### Software for Costing and Financial Analysis

The Manufacturing Cost Estimate (MCE) system and the Discounted Cash Flow (DCF) system are designed for manufacturing, engineering, consulting and analytical applications. MCE can be used to estimate fixed and variable manufacturing costs based on individual specifications for labor, utilities and raw materials. The program produces up-to-date cost listings for inclusion directly in reports. The DCF package aids managers and analysts in determining cash flow, rate of return and payback and escalation of income and individual costs. Separate interest rates can be used for borrowed and working capital, and tax losses and investment tax credits can be applied in the year incurred or carried forward.

The MCE and DCF packages run on the Apple II, TRS-80 and CP/M systems. MCE costs \$75, and DCF is \$125; both systems purchased together cost \$149.

Centec Process Systems, Inc., Centec Building, 11260 Roger Bacon Drive, Reston, VA 22090. Reader Service number 481.



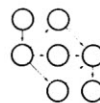
Two new business programs from Centec Process Systems, Inc.



Why learn FORTH? To do **BIG** jobs in little time!

— Timin FORTH release 2, a complete FORTH system (includes user manual/tutorial, resident editor & assembler)	\$95
— Manual only, credits toward diskette purchase	\$20
— Disk of FORTH application modules, by Scott Pickett (Full disk of FORTH source code. Clear, detailed documentation)	\$75
— Visual Image Editor, supplied in FORTH source code	\$75
— CP/M Utility Package, supplied in FORTH source code	\$50
— Timin FORTH release 3, a complete FORTH system (many new features, plus Visual Editor & CP/M package above) (Release 3.5, same price, has FORTH screens in CP/M file.)	\$235
— FLOATING POINT MATH option for release 2, 3, or 3.5	\$100
— ROMable FORTH, for engineers producing ROM code	\$350
— BOOKLET explaining FORTH, mailed same day, send cash	\$2

Above are 8" prices. Add \$15 for 5" North Star, Heath, Microp, etc.



Timin Engineering Company  
9575 Genesee Avenue, office E-2  
San Diego, CA 92121  
Orders: (714) 455-9008  
Technical Hotline: (714) 455-9041



## MICROMAIL

### CRT'S • PRINTERS • TELEPRINTERS

**TELEVIDEO**  
**910**  
**\$569.00**

**912 CALL**  
**920 CALL**  
**950 CALL**

**DIABLO**  
**630**  
**\$1950.00**

**1640 CALL**  
**1650 CALL**

**ANADEx**  
**DP-9500/9501**  
**\$1279.00**

**9000/9001 & 8000 CALL**

**CALL FOR OUR LOW PRICES ON**

**QUME, NEC, T.I., DEC**  
**TELETYPE, SOROC, C.I.TOH**

**TOLL FREE (800) 854-6028**

To Order: Send check to MICROMAIL, P.O. Box 3297, Santa Ana, CA 92703. Personal or company checks require two weeks to clear. Visa/MasterCard accepted. C.O.D. requires a 15% deposit.  
Handling: Add 3% to orders less than \$750, 2% to order \$751-\$2,000, 1% to orders over \$2,000.  
NOTE: Handling charges are waived on orders pre-paid in advance by check.  
Shipping: We ship FREIGHT COLLECT via UPS or Motor Freight. Air and Express delivery is available. Prices subject to change without notice.

**INTERNATIONAL ORDERS**  
**WELCOME**  
**TWX, WRITE or CALL**

**MICROMAIL** ✓88  
P.O. Box 3297  
Santa Ana, CA 92703  
Phone: 714/731-4338  
TWX: 910 595 1146



## Real World Interfacing Soul of a New Machine CP/M Handbook (Two Views) Real Time Programming Software Debugging Fifty BASIC Exercises

### Interfacing Microcomputers to the Real World

Murray Sargent III and  
Richard L. Shoemaker  
Addison-Wesley Publishing Co., Inc.,  
1981  
Softbound, 288 pp., \$14.50

A book review should not just praise a book or bury it, but should match the book to a compatible group of readers. That won't be easy this time.

*Interfacing* is immensely enjoyable, if you are into both hardware hacking and programming. But it's for neither the beginner nor for the expert. Even though both authors are from universities (Optical Science Department, U. of Arizona), the book is written in a sometimes painfully informal style. I still haven't figured out what waveform corresponds to their "bashed in sine wave" description.

Other informalities may offend some, like the advice to the puzzled reader to get a friend to explain things to him. You might expect the book to do that, but in many instances, it won't.

The authors assume that the reader has some background in both electronics and programming. At least that is the result of the presentation. While such elementary topics as the pin-outs and operating principles of TTL logic are discussed, the discussions are so superficial that a newcomer could not learn the subject from this book alone. I don't think that self-instruction for beginners was the intent of the book, and there are certainly enough references to additional reading like Don Lancaster's *TTL Cookbook* to back up my suspicions.

Beginners would also get lost by the fragmentation of subjects and the scrambled organization of the book. Seemingly everything you would ever want to know to hook up micros to external devices ranging from fiber optic transceivers to stepper motors is covered, including software written in assembly language, Pascal and FORTRAN. Obviously, with so many topics, nothing can be covered in any depth.

Now for the good part. While nothing is covered deeply, there is a wealth of information in the book, if you have the background to understand it. If you have done very much interfacing between computers and the real world, you won't need this book, but you might enjoy reading it anyway. If you are a hobbyist, experimenter or recently graduated engineer with not a whole lot of hands-on experience, this could be one of the most valuable book purchases you could make.

Sargent and Shoemaker have provided an ideal sourcebook, giving an overview of the world of interfacing. So many aspects are covered that it would be impossible to begin listing them here. If you are ready to get into hooking your computer up to the outside world, and want it to run your lawn sprinkler, air conditioning system or operate your ham station for you, this book would be a good place to get started. Provided you have that expert friend handy to help you out.

If you are the expert friend, you might buy this book to help you explain things to beginners. You might even find a topic or two that you need to brush up on, or never got into yourself. In any case, you will find this book both entertaining and

informative. And awfully informal.

**Ken Barbier**  
Borrego Springs, CA

### The Soul of a New Machine

Tracy Kidder  
Atlantic—Little, Brown  
Hardcover, 291 pp., \$12.95

Journalists have had a hard time finding heroes to write about during the last couple of decades. A hero by definition is larger than life, and life in the latter part of this century has become too overwhelming to let us accept the image of the lone conqueror. So writers have turned their attention to groups of ordinary people who collectively do something extraordinary. David Halberstam wrote *The Best and the Brightest*; Gay Talese wrote *The Kingdom and Power*, about *The New York Times*; and Tom Wolfe wrote *The Right Stuff*, about the American astronauts.

Now comes Tracy Kidder's *The Soul of a New Machine*, an inside look at how a group of 30 or so engineers—half of whom were right out of school—locked themselves in the basement at Data General for over a year to build the Eagle 32-bit supermini. The book presents further evidence that on America's technological frontier, the heroes have turned in their fancy spurs and silver six-shooters for soldering irons and microcode. Their work is as unspectacular as the gray walls surrounding them, and in the end the machine gets the glory. The satisfaction our computer cowboys get is personal, com-

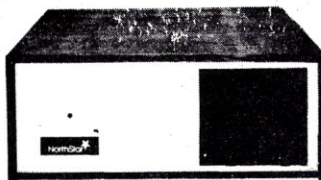


TO ORDER CALL TOLL FREE 1-800-526-7470

# MICRO MERCHANTS

31

## NORTH STAR In Stock



## North Star Horizon 2

### Special

64K - 1 - Disk Drive  
1 - 5 1/4 Meg Hard  
Disk Drive  
CPM 2.2 + All  
Software  
To Run Hard Disk  
**\$6599.00**

### POWERFUL NORTH STAR BASIC FREE SUPERB FOR BUSINESS & SCIENCE

Factory Assembled & Tested	List	Only
Horizon-2-64K-Double Den	\$4195	\$3125
Horizon-2-32K-Quad Density	\$3995	\$3040
Horizon-2-64K-Quad	\$4495	\$3420
Horizon Ram ASSM	16K = \$279	32K = \$489
Horizon Ram ASSM	48K = \$679	64K = \$881
Horizon Disk Drive Sale Double Den	SAVE!	
North Star Hard Disk 18 Mb	\$5375	\$4300
North Star Time Sharing Multi-User		CALL

## ATARI 800

(16K) PERSONAL/BUSINESS COMPUTER

- Computer Console
- Operators Manual
- Atari 8K Basic
- RF Modulator
- 57 Full Stroke
- Power Supply
- Alpha-numeric keys
- CALL
- & (4) Function Keys
- FOR PRICE

\*Add'l 16K RAM FREE w/Purchase of System

## ATARI OPTIONAL ACCESSORIES

Model #	Description	Price
810	Disk Drive System	\$ 475
815	Disk Drive System	\$1199
820	40-col. Dot Matrix Printer	\$ 279
822	40-col. Thermal Printer	\$ 349
825	80-col. Dot Matrix Printer	\$ 625
830	Acoustic Modem	\$ 159
850	Interface Module	\$ 139
410	Cassette Recorder	\$ 60

## ATARI SOFTWARE

Description	Price
Basketball	\$30.00
Super Breakout	\$30.00
Chess	\$30.00
Video Easel	\$30.00
3-D Tic Tac Toe	\$30.00
Star Raiders	\$34.00
Music Composer	\$42.00
Educational System ROM	\$19.95
Assembler/Editor	\$45.00
Telelink I	\$19.95
Space Invaders	\$15.95
Kingdom	\$12.95
Blackjack	\$12.95
Biorhythm	\$12.95
Graph It	\$15.95
Energy Czar	\$12.95
Mailing List	\$16.95
Statistics I	\$16.95
Paddle Controls	\$17.95
Joysticks (pair)	\$17.95
Touch Typing	\$19.95
Stock Charting	\$19.95
Stock Analysis	\$19.95
Bond Analysis	\$19.95

MANY MORE AVAILABLE



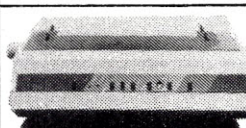
MasterCard and VISA Accepted

## APPLE SOFTWARE by EDU-WARE

Description	Price
COMPU-MATH (FRACTIONS)	\$29.95
COMPU-MATH (DECIMALS)	\$29.95
COMPU-READ	\$19.95
EDU-PAK I	\$35.00
TERRORIST	\$24.95
WINDFALL	\$16.95
NETWORK	\$16.95
SPACE	\$24.95
PRISONER	\$24.95
(ALL SOFTWARE ON DISK)	



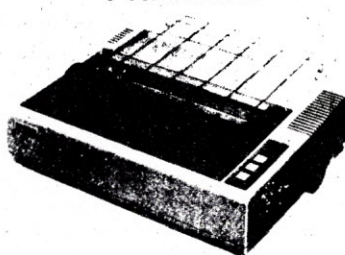
commodore



**Qume®**

CALL FOR PRICE

## EPSON MX-80 PRINTERS



Among its features, the MX-80 prints 96 ASCII, 64 graphics and 8 international character in tack-sharp 9x9 matrix. It prints bidirectionally at 80 CPS with a logical seeking function to maximize all of these capabilities. And it has the world's first disposable print head, with a life expectancy of over 50 million characters. When it wears out, just snap it out and throw it away! A new one costs less than \$30., and you can install it yourself...with one hand.

The most revolutionary thing about the Epson MX-80 isn't the bidirectional printing or the logical seeking function. It isn't even the disposable print head - although that's pretty revolutionary. The most revolutionary thing about the MX-80 is the price.

EPN-MX80	MX80 Tractor Feed	
	List \$649.	
	SALE PRICE	\$495
EPN-MX80V2	MX80 with Graphics option	\$560
EPN-MX80TF	MX80 with both tractor and friction feed	\$610
EPN-MX82	MX80 with high density graphics option	\$610

## Commodore

VIC-20	\$ 289
4032N	\$1080
8032	\$1499
CBM 4022 Printer	\$ 669
CBM 4040 Drive	\$1039
CBM 8050 Drive	\$1449
CBM C2N Drive	\$ 87
PET-IEEE Cable	\$ 37
IEEE-IEEE Cable	\$ 46

## PROFESSIONAL SOFTWARE

WordPro 1 8K	\$ 29.95
WordPro 3 (40 Clm.) 16K	\$199.95
WordPro 3 +	\$295.00
WordPro 4 (80 Clm.) 32K	\$375.00
WordPro 4 +	\$450.00

## MISCELLANEOUS/SUPPLIES

DISK DRIVES

Call for Prices

Quality Software for\*:

ATARI  
PET  
APPLE II Plus

TRS-80 (Level II)\*\*  
NORTH STAR  
CP/M Disks/Diskettes



**data  
systems**



Z80-FA  
List  
\$2895  
Our Price  
**\$2395**

**NOW  
IN STOCK**

Z-89GA with CP/M 2.2	
List: \$2595, Less Disk	\$2149
A-87 Two Drive Minifloppy System	
List: \$1195	\$ 989
Z-47DA 8" Two Megabyte Disk System	
List: \$3695	\$3059



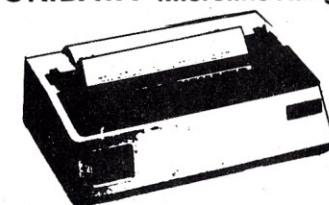
**data  
systems**



Z19  
Video  
Terminal  
Limited  
Time  
**\$799**

List: \$995

## OKIDATA Microline Range

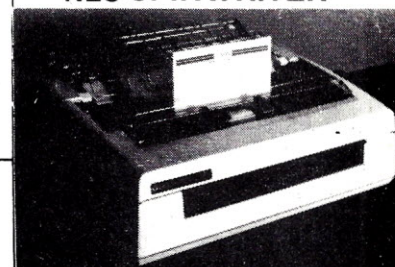


80 • 82 • 83

CALL FOR PRICES

The small, quiet, light, highly dependable printer with three way paper handling. Single sheet/roll/pin feed.

## NEC SPINWRITER™



Terminal/Keyboard as well as R0 Printer Only  
Models Available.

CALL FOR PRICES!

ORDERING INFORMATION: Phone orders invited using VISA, MASTERCARD or bank wire transfers. VISA & MC credit card service charge of 3%. AE credit card service charge of 5%. Mail order may send charge card number (include expiration date), cashier's check, money order or personal check (allow 10 business days to clear). Please include a telephone number with all orders. Foreign orders (excluding Military PO's) add 10% for shipping. All funds must be in U.S. dollars (letters of credit permitted). Shipping, handling and insurance in U.S. add 3% (minimum \$4.00). New Jersey residents add 5% sales tax. Our low margins prohibit us to send COD or on purchase orders or open account (please send for written quotation). All equipment is subject to price change and availability. Equipment is new and complete with the manufacturer warranty. We do not guarantee merchantability of products sold. All returned equipment is subject to a 15% restocking fee. We ship orders within 2 days.



ing primarily from the knowledge that somewhere in that hardware and software is their signature, some final product of their sweat and skill.

The book reads like a computer version of *The Magnificent Seven*. DG engineer Tom West puts together a team to come up with an answer to Digital Equipment Corp.'s VAX 32-bit mini. Some are young kids with peach fuzz on their faces; others are grizzled veterans of previous computer wars. They know it's going to be a dirty job—long days and nights, no sleep, no weekends off, low pay. But they're driven by the need to make something bigger than themselves.

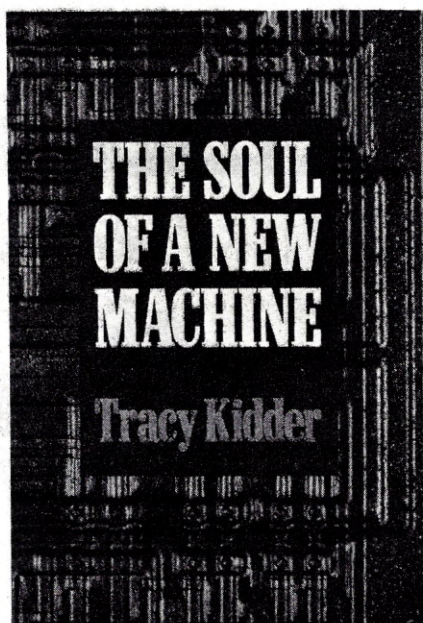
Kidder's account of the sacrifices made by the Eagle's creators will come as no revelation to anyone who has given himself up to a major project. But the average reader cannot help but be awed by the staggering amount of work and time necessary to build a major new computer. The volumes of paperwork, the rooms full of equipment, the endless detail, the excruciating debugging process—all conspire to show how much the computer transcends in complexity the abilities of any one person. While each of West's engineers responds to the task of building the Eagle in his own distinct way, the computer dominates. Only a few of the personalities Kidder describes project images that survive the machine by the book's end.

Despite the preeminence of the computer, Kidder succeeds in showing the human side of its invention and construction. We see engineers succumbing to the pressure and leaving the project; we see them playing Adventure at 4 AM; we see them fighting, yelling and laughing their way through the long arduous months. If the project is cold and logical, its workers are not; they use every trick and tool at their disposal to complete the best machine possible in the shortest amount of time, and their tool kit includes no small amount of luck and intuition. As Kidder points out, no matter what the corporate motivations for building the Eagle, "It seems more accurate to say that a group of engineers got excited about building a computer."

One of the most satisfying qualities of this book is the elegance Kidder lends it. *The Soul of a New Machine* is no kludge—Kidder is a professional wordsmith, and it shows on every page. He explains how a computer works, in simple and understandable terms, yet in a way that reveals something about the project and its engineers.

When discussing ROMs, for example, Kidder describes how West once jokingly called coworker Carl Alsing "a ROM-driven man." West then made up a song to the tune of "John Henry."

"West was always inventing catchy expressions, and 'ROM-driven' was Alsing's favorite," Kidder writes. "The contents of a ROM, once programmed in-



to the chip, cannot be altered or erased; the information can only be 'read.' ROM-driven: it opens up the ancient question of predestination and free will. Later, Alsing would wonder how the phrase applied to his friend. So would West himself, apparently, for one day downstairs, during the Eagle project, he would ask—laughing his nervous-sounding laugh, not the hearty one of the pig roasts—'Doesn't anything around here happen by accident?'"

Ultimately, the book arrives at the Big Question: What motivated the members of the Eagle team to give so much to a machine, one that would no doubt be eclipsed by something better in a few years? Kidder anticipates the question near the end of the book, but the answers he suggests are nothing that would encourage a college freshman to take computer science courses. They involve such intangibles as self-fulfillment, a feeling of accomplishment, self-satisfaction. Rosemarie Seale, the team's secretary, perhaps summed it up best:

"The bottom line on this is that effort was done; it was done well, with very little help from the corporation, if any; a lot of people were allowed to grow; a lot of people were allowed to feel good about themselves—not a pat on the back—but deep-down good about themselves. I guess all of us were trying to prove something."

**Eric Maloney**  
Microcomputing staff

### **The CP/M Handbook With MP/M**

Rodnay Zaks  
Sybex, Berkeley, CA, 1980  
Softbound, 336 pp., \$14.95

When you spend over \$200 for an op-

erating system, you shouldn't have to spend another \$15 to learn to use it. Unfortunately, the documentation of CP/M is both exhaustive and exhausting. Zaks has taken all the material, distilled the essence and presented it with style.

The first chapter can stand by itself. It is all that a nontechnical person needs to run a CP/M-based system. Zaks starts at square one and briefly describes all the parts of a computer system—even what a disk is and how it works. From there he goes on to explain running a program, writing to files and simple file manipulations such as opening, closing, renaming and erasing. He also covers reading the directory and printing a listing.

The second chapter goes a step deeper by describing inherent CP/M commands such as STAT, SAVE and REN (rename). It then deals with transient commands such as PIP, SYSGEN and MOVCPM. The treatment is not exhaustive, but it's sufficient for the first-time user. Tables and charts explain control characters and various combinations of commands.

The next two chapters alone are worth the price of this book. They describe PIP (peripheral interface program) and ED (text editor program). These chapters are useful for two entirely different reasons. PIP routines are commands that give CP/M much of its power, but they're difficult for both novice and veteran users to understand. Zaks leads you through them step by step. The ED program is described by Zaks as a minimal text editor—the nicest thing that I have heard it called. He suggests that you buy another text editor. However, he does go on to make the most of this program, and by the time I had finished the chapter, I was prepared to use ED.

In the next two chapters, Zaks describes the mechanics of CP/M including memory, disk maps and summaries of all the commands in versions 1.4 and 2.2 as well as MP/M. These are invaluable to a serious programmer. Once again they are present in Digital Research's documentation but are difficult to find.

The final two chapters are the icing on the cake. Zaks gives his own practical hints on the operating system. Even old hands will appreciate them.

I recommend *The CP/M Handbook* to everyone interested in CP/M, to everyone about to buy the system and to everyone who already has it and is either lost or thinks he knows it all. Fifteen dollars is a lot to spend for something that should have been supplied, but this book is worth every cent.

**Bruce Evans**  
Pickering, Ontario

If the manuals supplied by Digital Research weren't confusing, this book would not be needed. Unfortunately, Rodnay Zaks continues in the footsteps of Digital Research with a book that does



all it can to completely confuse the reader in Chapter 1.

Assuming that this book will be bought by either a prospective or an inexperienced user of CP/M, the reader will be lost before finishing page 6. Topics covered include two versions of CP/M, one of MP/M, Cromemco's CDOS, PIP, ED and BASIC. More confusion continues from page 7 to the end of the first chapter, with the author throwing everything at the reader from "How to Turn on the Cromemco" to WSU.COM and WMSG.COM!

If the reader does manage to struggle through Chapter 1, he then enters the area of incomplete topic coverage and outright misinformation. (I have two pages of notes on errors included in this book.) Of course, the book has a lot of usable information, but a first-time user of CP/M is not going to know how to find it, and won't have any way of filtering the good data from the bad.

This is all the more disturbing because Zaks started out with the right idea in mind: set down a set of simple instructions for the nonprogramming user of CP/M. Why he then gets bogged down in the intricacies of PIP in the first chapter is beyond comprehension. This pattern is continued throughout the book. Some topics are covered in needless detail; others are totally ignored. To confuse the reader struggling through the useful data, there are continual references to too many versions of CP/M, and instructions for MP/M which should have been segregated into an appendix or another book altogether.

The microcomputer world certainly has a need for a CP/M handbook. This isn't it.

**Ken Barbier**  
Borrego Springs, CA

### **Real Time Programming— Neglected Topics**

Caxton C. Foster  
Addison-Wesley Publishing Company,  
Inc., 1981  
Softbound, 190 pp., \$8.95

If I were teaching a class in interfacing, this would be my text.

If there is no class on interfacing, this can be your text.

Most of us in the home computer field did not perfect our skills under the auspices of the local state college. Digital electronics was learned from magazines, and interfacing was learned with soldering iron in hand. Just why a CMOS chip disintegrated before your eyes, or why that TTL chip output noise instead of a signal, were the kinds of things that there were no teachers around to tell you. What are pull-up resistors? What is the best combination of hardware and software?

Those of us still with it must have loved it, but are painfully aware of the fact that

there is still a shortage of the kind of information that newcomers to the computer field need. A B.S. in Computer Science does not usually mean that the holder of same knows anything about digital design, or peripheral drivers or interfacing to the real world. Only this year have a few colleges started offering microprocessor computing degrees that address these topics. I don't know what they are using for classroom texts, but if most of the students had this book, they probably would be spending their money on parts, and gaining some real experience, instead of taking the course.

If you open to the back of the book first, you will be scared to death of what you see. The cure for that is to open to the front of the book. Take it in order, at your own speed, one concept at a time. This book was put together by a master. Don't ruin his good work by jumping the gun.

All that is required is a grade school knowledge of electricity, a bit of algebra and some familiarity with the fact that CPUs have registers and instruction sets that do the work in a computer. It doesn't matter what chip. The 6502 and the Z-80 are used for examples, and assembler codes for both are explained. Where it applies, each example is shown in both instruction sets.

When a component is used in a circuit, the component is explained in a separate block of text. New concepts are also explained this way. The examples of how to use these devices and techniques are taken right out of the real world. Where a knowledge of the mathematics involved is helpful, the equations are carefully explained. The chapters and topics have been arranged so that the math builds upon what has already been discussed. This lowers the possibility of biting off more than you can chew.

When you've finished the book, you should have a good working knowledge of how to go about hooking your computer up to the world. Though the book starts with simple interrupts and port addressing, it soon works up to ac and dc control, testing and measure, and digital communications. You won't be an expert without a lot of actual building experience, but you'll know how to go about working on the problems that confront you, whether you are building a robot or sending electronic mail.

Mr. Foster has created a masterpiece. I am, quite simply, flabbergasted.

**Dennis Thurlow**  
Peterborough, NH

### **Software Debugging for Microcomputers**

Robert C. Bruce  
Reston Publishing Co., 1980  
Hardcover, \$17.95, paperback, \$10.95

Many books describe how to write a structured program, but few have been

written exclusively about debugging. *Software Debugging for Microcomputers* fills the gap.

The author describes how to write a flowchart, how to transform the flowchart into a BASIC program and how comments aid in the debugging process. He also gives guidelines for where and how many comments should be inserted in a program.

The book covers six debugging techniques, including something called "playing computer." This is a form of debugging that is done before a program is entered into the computer. The programmer places himself in the role of the computer and executes the program. This helps him find logical as well as syntactical errors.

One chapter covers the use of print statements as a debugging aid, while another introduces the technique of "forcing," where the programmer tries to execute every branch to ensure that the program handles all cases. Bruce admonishes that the input to the program be devised so that the output is as easy to verify as possible.

Chapter 6 covers block debugging, a useful technique when you're trying to debug large, segmented programs. Bruce introduces the concepts of a "stub" and a "driver."

Chapter 7 deals with a debugging technique called "snapshots," with which the programmer is able to see large volumes of debugging information in a manageable form.

Bruce also discusses the advantages of inserting sleeping debugging statements into a program. This saves much time when a program needs to be modified.

Patches are covered in chapter nine. Sometimes a programmer encounters a bug that he can't fix. When this occurs, some program lines are inserted to circumvent the error. This type of debugging should be done only as a last attempt at eliminating the error.

All the techniques are used when Bruce goes through the debugging of a program in the last chapter. The reader can see how each technique can be best used.

Bruce has done a good job explaining debugging. The techniques shown are easily used with other computer languages. *Software Debugging for Microcomputers* will make a welcome addition to any programmer's library.

**Ronald Brandow**  
Troy, NY

### **Fifty BASIC Exercises**

J. P. Lamoitier  
Sybex  
Softbound, 231 pp.

J. P. Lamoitier states that "the most effective way of learning a programming language is through actual practice," but



I doubt that any beginning level BASIC programmer will be able to practice using this book alone. *Fifty BASIC Exercises* introduces you to Armstrong numbers, Egyptian fractions and the Fibonacci maximal algorithm, but it doesn't give you a reasonable explanation of nested loops. It dives into the use of subroutines in program examples without an adequate explanation of a subroutine or general methods to properly use them.

Lamoitier omits many important programming concepts such as the CLS command and the logical AND and logical OR functions. Arrays are covered briefly, but a more detailed explanation is needed before a novice programmer could use them.

The author states that "all of the programs in the book are written in Microsoft BASIC and will execute directly on a TRS-80...." However, it is unclear which level of the TRS-80 he is referring to. For instance, Lamoitier states that there are only 26 string names available consisting of a letter of the alphabet coupled with the dollar sign. This would seem to indicate the Level I but the programs freely use features found only in Level II, such as the square and exponentiation functions.

This book does have some strong points. An outstanding effort is the direc-

tory program in Chapter 5, which demonstrates sorts in an interesting way with a well-documented example.

While any single volume can't be an encyclopedia, I would trade off casual mention of skewness and kurtosis for a definition of ASCII or the fact that DEFINT and DEFSTR exist. As a reference volume on BASIC it deserves consideration only if you already own two or three good books that concentrate on giving you the ability to understand the fundamentals of BASIC programming.

**Allan S. Joffe  
Dresher, PA**

## New and Noted

*Build Your Own Z-80 Computer.* By Steve Ciarcia. Byte Books/McGraw-Hill. Softbound, 332 pp., \$15.95. The author of the popular "Ciarcia's Circuit Cellar" in *Byte* magazine tells you how to build your own Z-80 computer.

*Computer Graphics.* By David Chance. Tab Books. Softbound (\$8.95) and hardbound (\$15.95), 280 pp. With 29 programs for the TRS-80.

*The 8085/SDK-85 (Hands-On): 54 Control Experiments.* By Howard Boyet. ITM Publications. Softbound, 394 pp., \$19.95. Presents "new areas, applica-

tions and topics of a more advanced nature not covered in volume 1."

*Information Technology and Health Care: the Critical Issues.* Karen Duncan, ed. AFIPS Press. Hardcover, 144 pp. Material derived from 1979 National Computer Conference Symposium on Issues in Health Care Computing.

*Packet Radio.* By Robert Rouleau and Ian Hodgson. Tab Books. Softbound (\$11.95) and hardcover (\$18.95), 304 pp. Book for both amateur radio fans and computerists on "principles and potentials of this innovative technique for high-speed, multi-user access to data resources."

*Playing the Stock and Bond Markets with Your Personal Computer.* By L. R. Schmeitz. Tab Books. Softbound (\$9.95) and hardcover (\$16.95), 308 pp. Stock selection, buy-sell decision-making, market evaluation.

*The 16-Bit Microprocessor Handbook.* Edited by Blacksburg Group. Group Technology, Ltd. Softbound, 350 pp., \$14.95. From the Blacksburg Continuing Education Series. Covers 8086, Z8001/2, 68000, 9900, LSI-11, 16032; includes software benchmarks.

*34 More Tested, Ready-to-Run Game Programs in BASIC.* By Delton T. Horn. Tab Books. Softbound (\$7.95) and hardcover (\$12.95), 224 pp. "All kinds of fun things to do on a home computer!"

# Your Pascal too slow? Not anymore...

with the PASCAL SPEED-UP KIT, which includes THE MILL: the easiest way to give your Pascal system a tremendous performance boost.

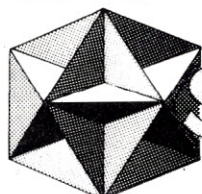
Here is how it works:

- 1) Plug in THE MILL
- 2) Run our configuration program one time
- 3) That's all

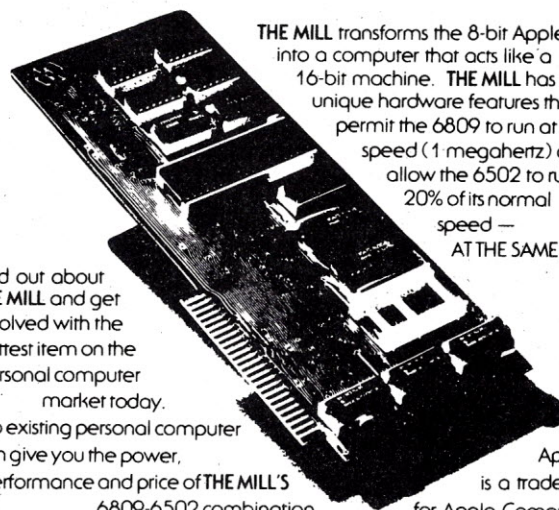
You now have a 30 to 300% faster Pascal P-machine, and you don't have to recompile, reprogram or relink. FORTRAN users may also take advantage of THE PASCAL SPEED-UP KIT. Contact your local Apple dealer for more information.

## THE ASSEMBLER DEVELOPMENT KIT

STELLATION TWO makes available the tools necessary to take full advantage of THE MILL. Enter the world of true MULTIPROCESSING with THE PASCAL SPEED-UP KIT and THE ASSEMBLER DEVELOPMENT KIT, available only from STELLATION TWO.



**STELLATION  
TWO**



THE MILL transforms the 8-bit Apple II into a computer that acts like a 16-bit machine. THE MILL has unique hardware features that permit the 6809 to run at full speed (1 megahertz) and allow the 6502 to run at 20% of its normal speed — AT THE SAME TIME!

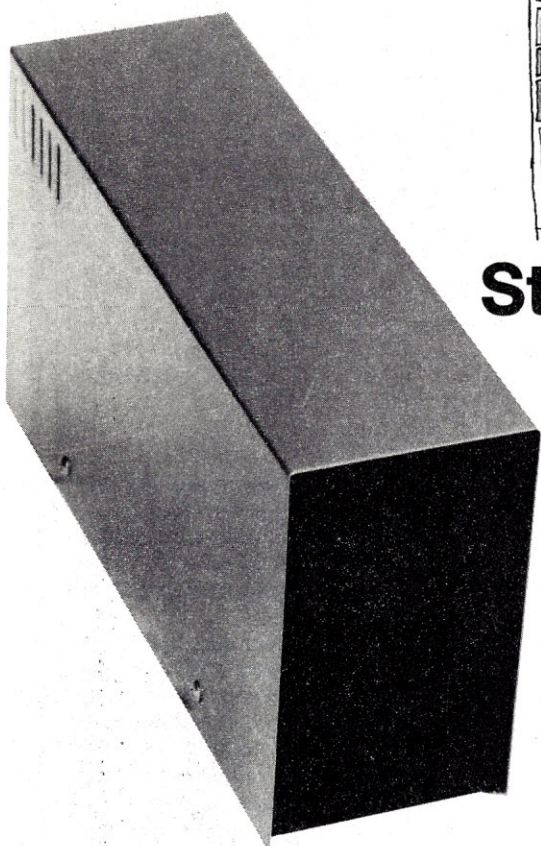
Find out about THE MILL and get involved with the hottest item on the personal computer market today.

No existing personal computer can give you the power, performance and price of THE MILL'S 6809-6502 combination.

Apple II is a trademark for Apple Computer, Inc.

P.O. BOX 2342  
SANTA BARBARA, CA. 93120 — M2  
(805) 966-1140





## Still have storage problems?

**(Model I or III)**

<b>Model 148</b>	250K, 1 Side, 40 Tracks.....	<b>\$321.00</b>
<b>248</b>	500K, 2 Sides, 40 Tracks per side.....	\$439.00
<b>196</b>	500K, 1 side, 80 Tracks.....	\$439.00
<b>296</b>	1 Meg, 2 Sides, 80 Tracks per side.....	\$590.00

## 10 Day Money Back Guarantee

## Standard Features Include

## ADDS MORE POWER TO YOUR SYSTEM

**(Orders only: 1-800-621-3229)**

**Information: 312-987-1024**

### Other Money Savings Opportunities Order by Phone or Mail

## MIDWEST

1467 S. MICHIGAN  
CHICAGO, ILLINOIS 60605

**FREE! UPS GROUND SHIPPING ON ALL ORDERS OVER \$100.00**

**MIDWEST COMPUTER PERIPHERALS**  
1467 S. MICHIGAN AVE.  
CHICAGO, IL 60605



Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_



## Three Games for the Atari SSG's General Ledger

### Three Games for the Atari

One of my pet peeves about computer card games is that they don't often truly simulate play as it would occur in real life. This is particularly the case with blackjack. Much of the time a single player competes with the computer/dealer. The computer often deals from a single deck, uncut and poorly shuffled. Finally, you can't ask your fellow player for advice.

Casino Blackjack/Counter from Manhattan Software is an exception. It lets you play with one, two or four decks. (Many casinos use two or four decks to minimize the effectiveness of "counting.") The deck(s) is then shuffled and cut. The cut gives the dealer a random place to reshuffle, another technique used to discourage counting in some casinos. Play then be-

gins; the computer acts as dealer and four other players. Your hand is displayed in the center of the screen.

You use the joystick to select the number of decks to be used, to place a bet, and to indicate what actions are to be taken during the deal. All the standard options are available to the player: insurance bets, splitting and doubling down. There is a 3-for-2 payoff for natural blackjack, and the dealer must hit on 16 and stand on 17, standard casino blackjack rules.

One of the ideas of this game is to help practice point counting. At any time when a bet is requested, you can select the option SEE POINT COUNT. The present count is displayed along with a suggested bet based on a simple system described in the documentation. If the current deck is nearly exhausted, a message warning

that it may be necessary to reshuffle during the current hand is displayed.

Casino Blackjack/Counter is a well written program and deserves a place in the library of anyone interested in playing blackjack.

Labyrinth Run looks simple. Indeed, the first portion of the simplest maze can be negotiated by even the most palsied hand. However, the slightest inattention results in a devastating crash, complete with loud embarrassing sounds of destruction.

Labyrinth Run is a fantastic game. The object, of course, is to get a runner through a maze in the shortest possible time. This simple goal is complicated by several factors. First, the runner moves rather quickly. Second, the mazes are cunningly designed with deceptive, easy stretches leading into tricky ones. Frustrations built up from many crashes then result in still more crashes after passing through the difficult section.

Labyrinth Run has three separate mazes, three levels of play, and a very interesting option, revolving doors.

All three mazes are designed to make you crash into the walls rather than to be difficult to solve. The first two involve the usual 90 degree turns. Number three has strange angles and is virtually impossible to get through except when playing at the highest skill level, which allows diagonal motion. Unfortunately, only the lowest skill level, novice, allows you to continue after a crash (though with a time penalty). Thus, the slightest error or lapse of vigilance results in sudden death for the runner.

After developing a little confidence with one of the mazes, it's fun to try the option, revolving doors. Toward the end of the maze there appear a pair of moving walls that open and close the path one must take to reach the end of the maze. It requires a combination of luck, good timing and a steady hand to get through.

Finally, here and there in each of the mazes are openings just wide enough for the runner to pass through. These pro-

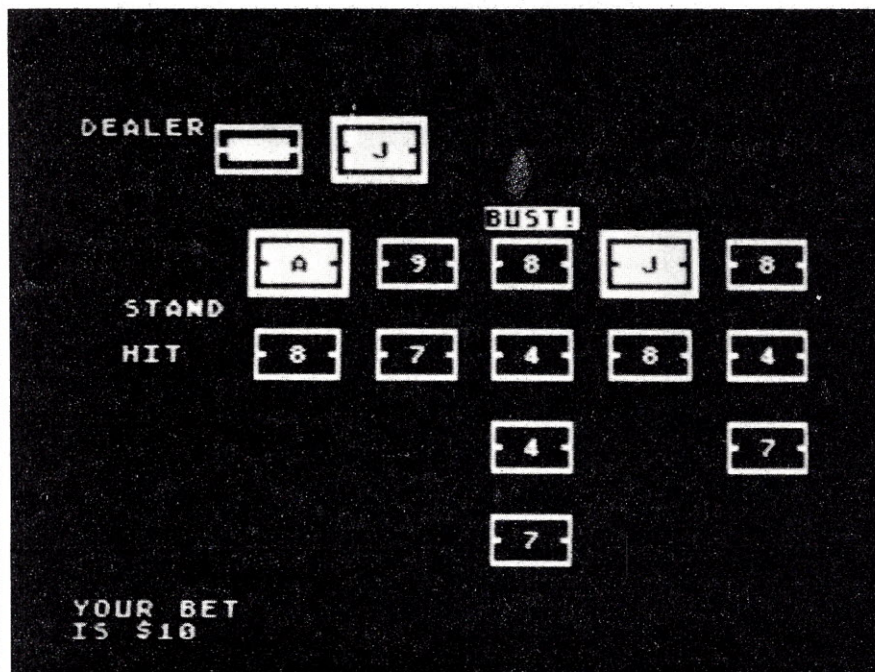
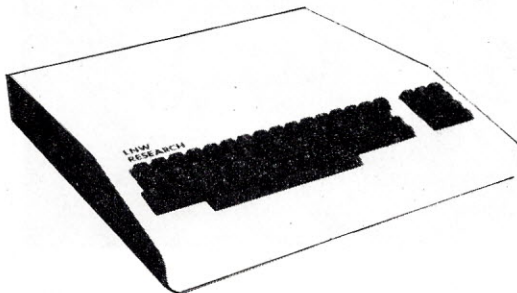


Photo 1. A scene from Casino Blackjack/Counter; I've just gone bust with 23. Note the options I had displayed at the left of the screen.



# 4MHZ, DOUBLE DENSITY, COLOR & B/W GRAPHICS... THE LNW80 COMPUTER



When you've compared the features of an LNW80 Computer, you'll quickly understand why the LNW80 is the ultimate TRS80 software compatible system. LNW RESEARCH offers the most complete microcomputer system at an outstanding low price. We back up our product with an unconventional 6 month warranty and a 10 days full refund policy, less shipping charges.

LNW80 Computer ..... \$1,450.00  
LNW80 Computer w/B&W Monitor & one 5" Drive ..... \$1,914.00  
All orders must be prepaid, CA residents please include 6% sales tax.  
Contact us for shipping charges

\* TRS80 Product of Tandy Corporation.  
\*\* PMC Product of Personal Microcomputer, Inc.

## COMPARE THE FEATURES AND PERFORMANCE

FEATURES	LNW80	PMC-80**	TRS-80* MODEL III
PROCESSOR	4.0 MHZ	1.8 MHZ	2.0 MHZ
LEVEL II BASIC INTERP.	YES	YES	LEVEL III BASIC
TRS80 MODEL 1 LEVEL II COMPATIBLE	YES	YES	NO
48K BYTES RAM	YES	YES	YES
CASSETTE BAUD RATE	500/1000	500	500/1500
FLOPPY DISK CONTROLLER	SINGLE/ DOUBLE	SINGLE	SINGLE/ DOUBLE
SERIAL RS232 PORT	YES	YES	YES
PRINTER PORT	YES	YES	YES
REAL TIME CLOCK	YES	YES	YES
24 X 80 CHARACTERS	YES	NO	NO
VIDEO MONITOR	YES	YES	YES
UPPER AND LOWER CASE	YES	OPTIONAL	YES
REVERSE VIDEO	YES	NO	NO
KEYBOARD	63 KEY	53 KEY	53 KEY
NUMERIC KEY PAD	YES	NO	YES
B/W GRAPHICS, 128 X 48	YES	YES	YES
HI-RESOLUTION B/W GRAPHICS, 480 X 192	YES	NO	NO
HI-RESOLUTION COLOR GRAPHICS (NTSC), 128 X 192 IN 8 COLORS	YES	NO	NO
HI-RESOLUTION COLOR GRAPHICS (RGB), 384 X 192 IN 8 COLORS	OPTIONAL	NO	NO
WARRANTY	6 MONTHS	90 DAYS	90 DAYS
TOTAL SYSTEM PRICE	\$1,914.00	\$1,840.00	\$2,187.00
LESS MONITOR AND DISK DRIVE	\$1,450.00	\$1,375.00	---

## LNW80

- BARE PRINTED CIRCUIT BOARD & MANUAL ..... \$89.95

The LNW80 - A high-speed color computer totally compatible with the TRS-80\*. The LNW80 gives you the edge in satisfying your computation needs in business, scientific and personal computation. With performance of 4 MHz, 280A CPU, you'll achieve performance of over twice the processing speed of a TRS-80\*. This means you'll get the performance that is comparable to the most expensive microcomputer with the compatibility to the world's most popular computer (TRS-80\*) resulting in the widest software base.

### FEATURES:

- TRS-80 Model 1 Level II Software Compatible
- High Resolution Graphics
  - RGB Output - 384 x 192 in 8 Colors
  - NTSC Video or RF MOD - 128 x 192 in 8 Colors
  - Black and White - 480 x 192
- 4 MHz CPU
- 500/1000 Baud Cassette
- Upper and Lower Case
- 16K Bytes RAM, 12K Bytes ROM
- Solder Masked and Silkscreened

## LNW SYSTEM EXPANSION

- BARE PRINTED CIRCUIT BOARD  
AND MANUAL ..... \$69.95  
WITH GOLD CONNECTORS ..... \$84.95

The System Expansion will allow you to expand your LNW80, TRS-80\*, or PMC-80\*\* to a complete computer system that is still totally software compatible with the TRS-80\* Model 1 Level II.

### FEATURES:

- 32K Bytes Memory
- 5" Floppy Controller
- Serial RS232 20ma I/O
- Parallel Printer
- Real Time Clock
- Screen Printer Bus
- On Board Power Supply
- Solder Masked and Silkscreened

**LNW RESEARCH**  
CORPORATION

2620 WALNUT  
TUSTIN CA. 92680

ORDERS & INFO. NO. 714-544-5744  
SERVICE NO. 714-641-8850

## LNDbabler & DOS PLUS 3.3D

- Assembled and Tested W/DOS PLUS 3.3D.....\$175.00

Double-density disk storage for the LNW Research's "System Expansion" or the Tandy's "Expansion Interface". The LNDbabler™ is totally software compatible with any double density software generated for the Percom's Doubler\*\*\*. The LNDbabler™ provides the following outstanding features.

- Store up to 350K bytes on a single 5" disk
- Single and double density data separation
- Precision write precompensation circuit
- Software switch between single and double density
- Easy plug in installation requiring no etch cuts, jumpers or soldering
- 35, 40, 77, 80 track 5" disk operation
- 120 day parts and labor Warranty

\*\*\* Doubler is a product of Percom Data Company, Inc.

### DOS PLUS 3.3D

Micro Systems software's double density disk operating system. This operating system contains all the outstanding features of a well developed DOS, with ease in useability.

## KEYBOARD

LNW80 KEYBOARD KIT ..... \$84.95

The Keyboard Kit contains a 63 key plus a 10 key, P.C. board, and remaining components.

## CASE

LNW80 CASE ..... \$84.95

The streamline design of this metal case will house the LNW80, LNW System Expansion, LNW80 Keyboard, power supply and fan, LNDbabler™, or LNW Data Separator. This kit includes all the hardware to mount all of the above. Add \$12.00 for shipping

### PARTS AVAILABLE FROM LNW RESEARCH

- 4116 - 200ns RAM
  - 6 chip set ..... \$26.00
  - 8 chip set ..... \$33.50
  - 16 chip set ..... \$64.00
  - 24 chip set ..... \$94.00
  - 32 chip set ..... \$124.00
- LNW80 "Start up parts set" LNW80-1 ..... \$82.00
- LNW80 "Video parts set" LNW80-2 ..... \$31.00
- LNW80 Transformer LNW80-3 ..... \$18.00
- LNW80 Keyboard cable LNW80-4 ..... \$16.00
- 40 Pin computer to expansion cable ..... \$15.00
- System Expansion Transformer ..... \$19.00
- Floppy Controller (FD1771) and UART (TR1602) ..... \$30.00

VISA MASTER CHARGE UNLESS NOTED  
ACCEPTED ADD \$3 FOR SHIPPING



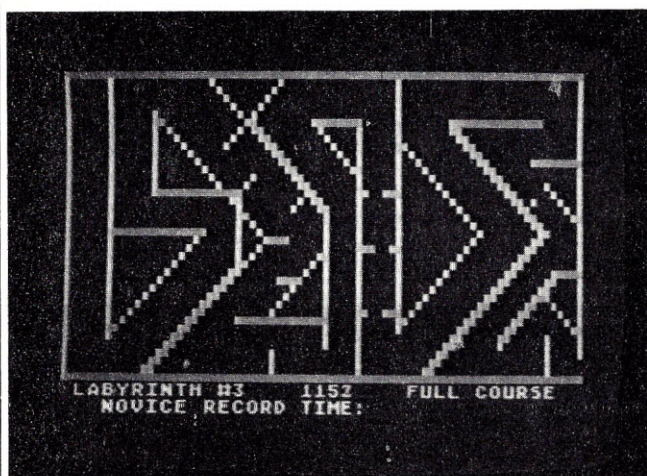


Photo 2. Course 3 of Labyrinth Run. The "runner" is at the far right of the screen just above center.

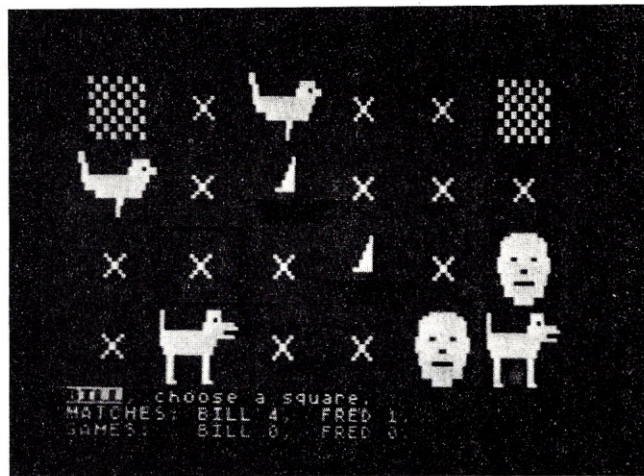


Photo 3. A moment in Concentration when I'm actually beating my roommate.

vide time-saving shortcuts, but the problem is hitting the hole rather than the wall.

This is an excellent game, particularly for parties. It's fun to watch the times gradually increase as the supply of alcoholic potables decreases. (The determination of the players also seems to increase as their ability to coordinate eye and hand decreases.)

Concentration is a computerized version of the old television game. The object of the game is to match pairs of objects. Since this is a two-player game, the winner is the one who has made the most matches when all the objects have been revealed.

The game is simple to play. You move a box around the screen and when it is positioned on the square you want to reveal you press the fire button of your joystick. You then select a second square in the same way. If the revealed objects match, you get a point, the objects stay on the screen, and you get another chance. If they don't match, both are concealed again and your opponent tries his memory.

As you can see in Photo 3, this game makes excellent use of the Atari color graphics capability. There are a number of levels of play; the more objects there are to match (up to 12), the more difficult the game is. The game is fun for adults at the high end and is particularly good for young children at the lower levels. This is a game that can be a challenge at any age level.

**William Colsher**  
Lisle, IL

#### Ordering Information

**Casino Blackjack/Counter** (\$19.95)  
24K, one joystick  
**Labyrinth Run** (\$14.95)  
16K, one joystick  
**Concentration** (\$14.95)  
16K/24K, two joysticks  
Manhattan Software  
PO Box 35  
Pacific Palisades, CA 90272

### Structured Systems Group, Inc.'s General Ledger

The GFS Micro-Computers partnership was formed to do data processing for a small CPA firm. We needed a general ledger package that would be adaptable to different clients from different sized firms would be easy to learn and use and would have as much error detection ability as possible.

Since my teaching duties at Clarkson College include teaching an introductory course on computers and BASIC programming, I was elected to do most of the legwork. I chose General Ledger (Structured Systems Group, Inc., 5204 Claremont, Oakland, CA 94618), and I have never regretted it.

Although the introduction to the manual states that the General Ledger is written for CPA firms, it is so flexible that it can be adapted to any small business—if the business seeks help from its accountant in the initial setup.

The General Ledger is a menu-driven package written in CBASIC-2 to run on computers using CP/M, but it is no longer necessary to actually own the CBASIC language program. SSG has developed its own system including CBASIC and the programs written in CBASIC. This SSG system is called Itworks, probably, I suspect, because it does. Running SSG's General Ledger is as simple as inserting the proper disks and typing GL and the date, although the date will be requested at a later time if it is not entered to start the program.

#### Parameter System

General Ledger uses parameter files which must be entered at least once and may be changed as desired. These files contain basic information, such as company name, name of statements to be produced, size and type of paper and other report characteristics. The General Ledger will not run if parameter entry is not completed, and the program lets you

know this in no uncertain terms by requiring entry at the first menu. One of the best features of SSG's General Ledger is its ability to detect errors, such as programs run out of sequence or lack of parameter files, and to refuse to go on until these errors are corrected.

#### Chart of Accounts

The General Ledger requires you to enter a chart of accounts, which is a list that assigns account numbers to the accounts which will be used. This step is crucial, because the output statements—Income Statement, Balance Sheet and Statement of Changes in Financial Position—are formatted by the numbering system chosen for the chart of accounts. It is at this point that a friendly accountant should be consulted, since the chart of accounts and numbering system will determine the usefulness of the statements both to the company and to outside users, such as bank loan officers.

As part of this initial setup, SSG has included the ability to generate sample statements that show the format of the balance sheet and income statement without you entering monetary amounts. The program generates the monetary amounts, but it must be noted that these sample statements will not balance, as the amounts are entered only to demonstrate what the statements will look like.

#### Transaction Entry

Once the chart of accounts is finished, it is possible to begin entering batches of transactions. Journal Entry is chosen from the menu, and a minimenu with a choice of two journals appears: General Journal for most transactions and Cash Disbursement for entries from a check-book. The technique used is called form-filling, since the cursor moves to the proper screen position as required, and the spaces can easily be filled in and verified. Once again, SSG has designed superior error-catching programs, so the only mistakes that can be made are human—



miscopying data or misentering references. However, two running balances at the bottom of the screen make it possible to spot errors.

The next step is to print a proof sheet, which lets you make another comparison with the original documents. When you are satisfied with the journal proof, the journal batch is posted to a detail file. A trial balance and two different types of ledger reports can then be generated, but the period cannot be closed, and statements cannot be printed, until the detail file balances.

After the period is closed, the three statements may be generated, with the journal proof sheet, the trial balance and ledger reports acting as a hard-copy audit trail. Accountants will appreciate the audit trail, while management will appreciate the usable statements.

#### Other Features

There are other features which are useful in certain instances, such as multiple profit center and branch reporting. An example of a use of multiple profit centers would be to separate a retail store into departments; an example of branch reporting would be when a firm has more than one location and wants the income from these reported separately. Unfortunately, these options cannot be used si-

multaneously, but it is possible to adjust the chart of accounts to simulate either a multiple profit center or a branch.

A feature which is extremely important to the accountant is the Statement of Changes in Financial Position, which is required by Generally Accepted Accounting Principles along with the Balance Sheet and Income Statement. The Statement of Changes is difficult and time-consuming to develop manually, but the SSG General Ledger makes it simple, as it generates the entire statement within a matter of minutes.

Because of the batch transaction system used in the General Ledger, the posted detail file must be sorted by chart of account number, and the chart of accounts itself must also be sorted. SSG has included in the package a version of the QSORT, which does an efficient job of handling the necessary sorts.

Structured Systems Group offers a unique service called the Software Maintenance Plan. For a monthly fee, the user is entitled to updates as they are issued and to answers to questions which the user or the dealer cannot answer. The people on the SSG Hotline are cooperative and knowledgeable about their products.

#### Conclusions

I am pleased with the Structured Sys-

tems Group's General Ledger. It has done everything I could have wanted, and has never failed to impress me with its versatility. It is, however, necessary to comment on the questions of whether it is easy to use and easy to learn.

As with any computer program, this one is easy to use only after you have gone through the manual thoroughly and worked with the program. The manual could use some improvements in explanations and diagrams, as well as an index, but I am sure SSG will revise it when possible.

Meanwhile, the initial setup is the most involved part, and this must be done carefully, since the quality of the reports generated depends on the setup. As stated before, I recommend seeking the help of an accountant at this point, and when it comes time to close out the year—although this is for accounting purposes and not because the General Ledger requires it.

Once the chart of accounts is entered, the rest of the program runs well, is easy to learn, easy to use and comprehensive. All in all, the Structured Systems Group's General Ledger is a satisfactory package for business data processing.

**Harvey A. Factor**  
Potsdam, NY

## Quality Products With Support And Service For Less!!!

16K Radio Shack Model 3 computer \$839—48K for \$899

With 2 40 track drives \$1890 and a RS232 for \$1959

16K for the Radio Shack Model 1, 3, and Apple 2+ \$16

Percom Electric Crayon—add color and hi-res graphics to your model 1 \$139

The Connection—for Model 1—300 baud—orig. only & direct connect for \$119

Lex 11 coupler—300 baud—orig/ans-half/full duplex \$129

Omnitek 40 track drive w/p.s. & case \$295—80 track \$395—5 & 3 ms access

Omnitek 80 track dual head drive with p.s. and case \$499

Omnitek 8" disk drive power supply and case \$699

Omnitek Power Supply and Case for 5" drives \$63 and for 8" drives \$139

Omnitek cables for 5" drives—2-drive for \$24 and 4-drive for \$29

Omnitek cables for 8" drives—1-drive for \$24 and 2-drive for \$34

Economy 5" double density disks \$24 with center rings \$28

Disks for 8" drive—double density \$36

12" B&W Leedex (Amdek) Monitor \$114 and 10" B&W APF Monitor \$99

Base 2 printer \$539 C.Itoh Starwriter \$1439

Okidata Microline 80 printer \$369 Tractor \$50

Okidata Microline 82A printer \$499 and 83A \$749—120cps, uc/lc/graphics

Call for Quotes on Epson, Apple, and Commodore equipment.

Dealer inquiries invited. Mass. Residents add 5% Tax. F.O.B. Tewksbury, freight extra. M/C, Visa or check accepted. TRS-80 is a reg. trademark of Tandy Corp.



**commodore**

✓ 140

**Omnitek Computers International Inc., 1899 Main St., Tewksbury, Ma 01876**



# PERSPECTIVES

(continued from page 242)

well as any travel expenses related to attending the classes if such expenses were not reimbursed by his employer.

Documentation of all expenses will be required if E wishes to claim such items as employee business expenses. A letter by his employer may be required to justify the need and use of the computer as well as specimens of the work produced. Travel expenses can usually be documented by a mileage log or a similar instrument. Education expenses are usually deductible if they improve skills required by the present job, and do not qualify the individual for another job and are not taken to meet the minimum requirements for the present job.

Publications 508, 529 and 587 from the IRS can provide some additional information on employee business expenses.

## Tax Preparation Expenses

The IRS allows a deduction to be made for any reasonable expenses related to the preparation of individual income taxes. If you purchase books, computer programs or use your computer for the maintenance and computation of income tax information, such expenses are deductible.

*Ms. R is an executive with a large corporation and incurs a substantial amount of expenses relating to her job. She decides to purchase a microcomputer to help her maintain records on those expenses. In addition to the computer, she also purchased assorted software packages which will be used to assem-*

*ble and calculate her taxes for the year.*

*The system costs \$2500 and she figured that it would pay for itself in a few years because her accountant normally charges \$1200 per year to assemble the information for her.*

The IRS allows a deduction to be made for tax preparation expenses. Tax preparers typically charge anywhere from \$20 to \$500 for the preparation of individual income taxes. If a taxpayer elects to prepare his or her own taxes with the aid of a computer, such expenses are deductible if they are reasonable. There is no set formula, but common sense should dictate whether or not an expense is reasonable. Also note that if the computer is only used 10 percent of the time for tax purposes, only 10 percent of the expenses should be deducted.

Computer software and manuals for the preparation of taxes are generally fully deductible provided that it is within reason. A person preparing a short form will not need to spend \$200 for preparation material, while a person with a business may easily spend \$500.

Tax preparation expenses and/or fees are deductible only if you itemize deductions. Persons using the short form will not be eligible to deduct tax preparation expenses.

## Investment Expenses

If a computer is used to maintain records on individual investments, the expenses are also deductible. Typical applications may include using the computer to monitor a stock portfolio or the financial status of income property. The same rules apply to investment expenses as tax preparation expenses.

## Investment Credit

If you buy certain new or used tangible personal property (computer and peripheral devices) with a useful life of at least three years for use in your job or business, the equipment qualifies for a credit of up to 10 percent of the cost of the qualifying property (form 3468).

*Ms. C purchased \$5000 worth of computer equipment for her software company and she expects to use the system for at least seven years. The equipment will qualify for a 10 percent investment credit of \$500. The tax credit will result in a reduction or refund of \$500 to Ms. C.*

The investment credit is based upon the expected life years of the qualifying property. A maximum credit is given for equipment with a life of seven years or more. For more details on computing investment credit, see IRS publication 572.

## Capital Gains and Losses

A capital gain or loss is realized when you sell property that was held for trade or business.

*Ms. C decided to sell one of her computers because the manufacturer went out of business and the computer was not*

*supported by any local dealer. The computer cost her \$2000 and she was only able to sell it for \$200 because it was no longer in demand. She may deduct a loss of up to \$1800 on the transaction if the machine was used in her business.*

Different methods of calculating the loss would be used if the machine was held for more than one year and if any depreciation was claimed. Details on how to claim the loss are included on schedule D.

## Depreciation

If you plan to deduct expenses from the use of computer equipment, such expenses must be "capitalized" over the life of the equipment. This is commonly referred to as a depreciation expense. A simple formula for computing depreciation is as follows:  $\text{cost} - \text{salvage value} \div \text{life}$ .

For example, if  $\text{cost} = \$5000$ ,  $\text{salvage value} = 0$  and  $\text{life} = \text{five years}$ , then  $\text{depreciation expense for year 1} = (\$5000 - \$0) \div 5 = \$1000$ .

The example shows a straight line depreciation. There are several other methods used in calculating depreciation expenses. It is a fairly complex area and is beyond the scope of this article. If you qualify for a depreciation deduction for your computer equipment, consult an accountant or tax attorney for a determination of which method to use.

## Tax Planning

If you are planning to purchase a computer and/or enter into a business which will use computers, some advance planning can save you significant amounts of money. In order to claim the deductions outlined in this article, you must be able to document all expenses as well as detail their use. Even if you are purchasing a computer strictly for hobby use, save all receipts because if you enter into a business later that year, you can deduct a percentage of the computer use.

If you plan to lease a computer system, make sure that the lessor elects to pass the investment tax credit to you; otherwise, you can lose up to 10 percent of the cost of the system.

For 1981, there have been several proposed changes in the tax laws which will provide more favorable tax treatment of equipment purchases. Once these laws have been enacted, the changes should be taken into account when determining depreciation and investment tax credits. □

## References

*West's Federal Taxation: Individual Income Taxes*, Phillips & Hoffman, 1981 Edition, Prentice Hall.

*1981 U.S. Master Tax Guide*, Commerce Clearing House.

*Internal Revenue Code*, U.S. Government Printing Office.

*Publication 17: Your Federal Income Tax*, (an expanded instruction booklet for completing form 1040 free for the asking from the IRS).

## FLOPPY DISK DRIVES \$275

Famous make 40 Track drives, in grey textured enclosure with power supply. Fully tested and guaranteed.

**ADD \$20 FOR "FLIPPY,"**  
**80 TRACK "FLIPPY" \$395**  
**40/40 DOUBLE SIDED \$395**  
**EPSON PRINTERS \$CALL**  
**C. ITOH PRINTERS \$CALL**

CORSAIR COMPUTER CORP.  
7952 Highway 80 West  
Fort Worth, TX 76116  
**817-244-8051**

✓346



# **WE HAVE MOVED TO**

**943 W. Genesee St. Syracuse, N.Y. 13204**

Thank you . . .

. . . for making our expansion possible and for helping make us the leading distributor of microprocessor systems, terminals and printers.

We are showing our appreciation by producing a special catalog with thousands of items at greatly reduced prices.

Call or write today.

***JOIN US IN OUR  
PRE-INVENTORY CLEARANCE***



**Mini Micro Mart, Inc.**

**943 W. Genesee St.**

**PO Box 2847**

**Syracuse, N.Y. 13220**

**[315] 422-4467 TWX 710-541-0431**



# Computers, Disk Systems

**ZENITH**

data  
systems



**Z89-FA**  
List \$2895  
**OUR PRICE**  
**\$2395**

**NOW  
INSTOCK!**

**Z-89GA**  
List \$2595, Less Disk ..... \$2149  
**A-87 Two Drive**  
Minifloppy System List \$1195 ..... **\$989**  
**Z-47DA** ..... **\$3695**  
8" Two Megabyte Disk System  
List \$3695 ..... **\$3059**

## INTERSYSTEMS

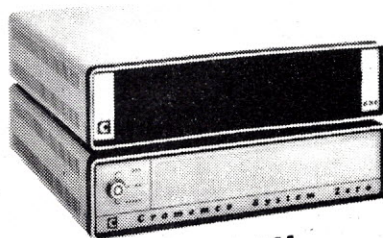
formerly ITHACA AUDIO

The new Series II CPU Board features a 4 MHz Z-80A CPU and a full-feature front panel. 20-slot actively terminated motherboard, with 25 amp power supply (50/60 Hz operation, incl. 68 cfm fan). DPS-1, List \$2195 **CALL FOR PRICE**



COMPLETE SYSTEM with InterSystem 64K RAM, I/O Board and double density disk controller board. List \$3795

**CALL FOR PRICE**



**NEW!**  
**Cromemco**

## SYSTEM ZERO/D

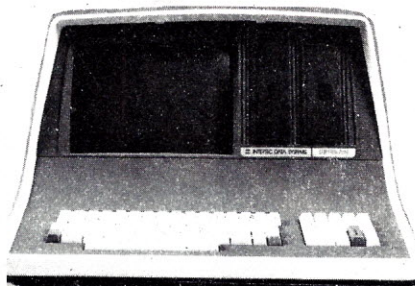
A complete 64K Computer with Double Density Disk Controller ..... List \$2995  
**OUR PRICE \$2545**

Companion Disk drive for above —  
Quad Density — Total of 780 Kilobytes of storage on the two drives. .... List \$1295

**OUR PRICE \$1099**

Only \$3644 for a complete 64K Disk System

## SUPERBRAIN



64K Double or Quad Density units available. Uses two Z-80 CPU's. Commercial-type terminal with 12" monitor. Dual double density minifloppies. Over 350 kilobytes of storage (twice that with quad density drives). Two serial RS232 ports, I/O ports standard. Comes with CP/MTM 2.2 operating system. MiniMicroMart can supply a wide range of CP/M development and application software.

w/64K Double Density, List \$3495 .. **\$2869**  
w/64K Quad Density, List \$3995. .... **\$3395**

## DYNABYTE

DB 8/1



DB 8/1-64 — 64K RAM SYSTEM WITH Z80 CPU and 2 serial and 1 parallel I/O. List \$3395.

**OUR PRICE \$2695**

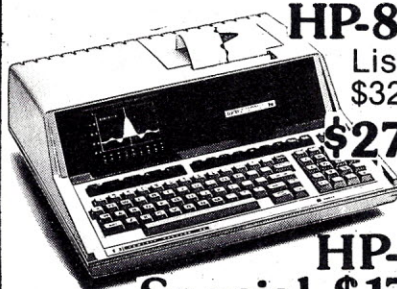


**hp** HEWLETT  
PACKARD  
**HP-41CV \$259**

**HP-41C**  
**\$189**

**HP-125...\$3149**

**AVAILABLE  
NOW!**



**HP-85A**  
List \$3250  
**\$2749**

**HP-83**  
**Special \$1749**

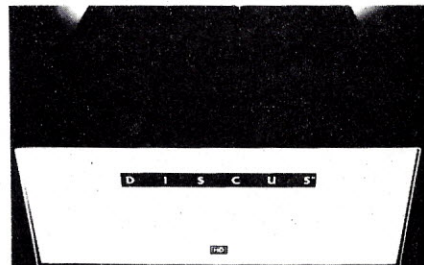
F.O.B. shipping point. All prices subject to change and all offers subject to withdrawal without notice. Advertised prices are for prepaid orders. Credit card and C.O.D. 2% higher. C.O.D. may require deposit.

## MORROW

**THINKER TOYS®**  
**DISCUS M26™**

26 megabytes of formatted storage  
List \$4495

**NEW  
LOW \$3795**



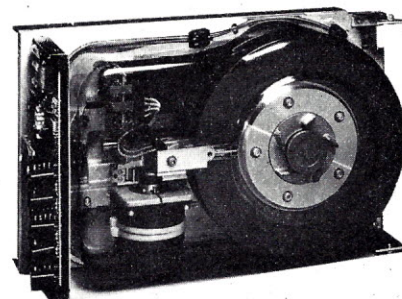
**THINKER TOYS®**  
**DISK SYSTEMS**

Now includes CP/M® 2.2

Discus 2D, List \$1095. .... \$898  
Discus 2D, dual-drive, List \$1875. .... \$1549  
Discus 2 + 2, A&T, List \$1495. .... \$1239  
Dual Discus 2 + 2, A&T, List \$2575. .... \$2137

All Morrow floppy disks include CP/M® 2.2 and Microsoft Basic 80

## MORROW



List \$3695

**DISCUS M-10**  
10 Megabyte  
Wirchester

**OUR PRICE**  
**\$3095**

**NEW! CROMIX  
FROM CROMEMCO**

A New UNIX Like  
Disk Operating System.  
With true multi-user,  
multi-tasking capabilities

List \$295 ..... **OUR PRICE \$249**

**NEW! DOUBLE DENSITY  
CONTROLLER BOARD**

FROM CROMEMCO  
With built-in diagnostics  
16 FDC Controller.

List \$595

**OUR PRICE \$499**

— WRITE FOR FREE CATALOG —

943 W. Genesee St. Syracuse, N.Y. 13204

(315) 422-4467

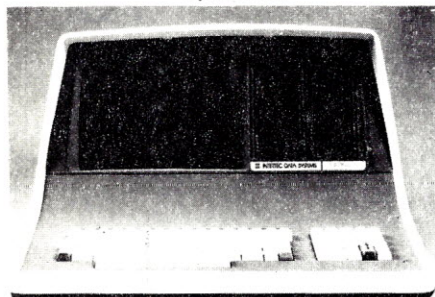
TWX 710-541-0431

**Mini Micro Mart, Inc.**



# Best Prices and Delivery!

## SUPERBRAIN by Intertec



Self-contained computer with dual disks and two RS232C ports. Complete with CP/M 2.2. 64K Double Density, List \$3495... \$2869  
64K Quad Density List \$3995... SPECIAL \$3395

## VIDEO TERMINALS

INTERTEC EMULATOR, List \$895	\$ 749
INTERTUBE III, List \$895	ONLY 749
SOROC IQ 120, List \$995	SPECIAL 729
SOROC IQ 130, List \$699	599
SOROC IQ 135, List \$1095	749
SOROC IQ 135 G, List \$1195	799
SOROC IQ 140, List \$1495	1149
HAZELTINE ESPIRIT, List \$695	NEW 595
HAZELTINE 1410, List \$900	CALL
1420	CALL
1500, List \$1225	CALL
1510, List \$1395	CALL
1520, List \$1650	CALL
TELEVIDEO 910, List \$695	NEW CALL
912C, List 950	CALL
920C, List \$1030	CALL
950C, List \$1195	NEW CALL

## PRINTERS

ANADIX DP-8000	\$ 849
DP-9500, List \$1650	1349
DP-9501, List \$1650	1349
PAPER TIGER IDS-445, List \$995	695
PAPER TIGER IDS-445G, w/graphics op., incl. buffer, \$1195	789
PAPER TIGER IDS-460, List \$1094	919
PAPER TIGER IDS-460G, List \$1394	1139
PAPER TIGER IDS-560, List \$1295	1089
PAPER TIGER IDS-560G, List \$1395	1169
NEC Spinwriters	CALL FOR PRICE
TELETYPE 43 KSR/WRS232	1087
CENTRONICS	
730-1 parallel interface	NEW LOW \$ 599
730-3 RS232-C	649
737-1 parallel interface	799
737-3 RS232-C	849
739 w/graphics, List \$999	829
779 w/tractor, List \$1350	799
RS232 Serial	1595
704-9 w/tractor, parallel, VFU, List \$2350	1695
TI 810 Basic, List \$1895	1595
810/serial & Centronics-style parallel interface, List \$1940	1635
810 w/full ASCII (U/LC), VERTICAL Forms Control, Compressed Print	1795
TI 820 RO, Basic, lower case	1695
TI 820 KSR, List \$2165	1795
TI 745, List \$1695	1399
AXIOM IMP I	699
OKIDATA Microline 80, List \$949	499
RS232 Serial Interface	99
tractor feed option	109
OKIDATA Microline 82	679
OKIDATA Microline 83	1069

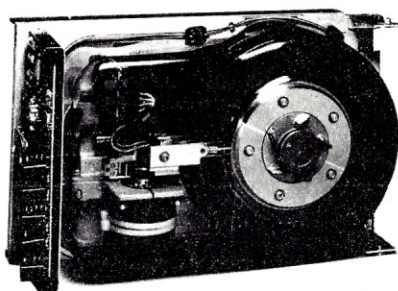
## NORTH STAR HORIZON CALL

### FLOPPY DISK SYSTEMS

NORTH STAR MDS-A-D, List \$899	\$ 749
MDS-A-Q, List \$1099	898
THINKER TOYS Discus 2D	
Discus 2D, single drive, DD, List \$1095	\$ 898*
Discus 2D, dual-drive, List \$1875	\$1549*
Discus 2&2, A&T, DD, double sided, List \$1395	\$1169
Dual Discus 2&2, A&T, List \$2495	\$2099*

\*Now includes CP/M 2.2 and Microsoft Basic

### HARD DISKS



M10, 10 Mbytes, List \$3695	\$3095*
M26, 26 Mbytes, List \$4495	NEW LOW \$3795*

### PROM PROGRAMERS

SSM PB1 Kit	\$ 152
SSM PB1, A&T, List	225
SD Computer Prom 100 Kit	199
SD Computer Prom 100, A&T, List	264

### FLOPPY DISK CONTROLLER BOARDS

Cromemco 16FDC, double density disk controller, List \$595	\$ 499
NORTH STAR, DD Controller, List \$565	479
Disk Jockey 2D, A&T, List \$399	329
SD Versafloppy I, Kit, List \$284	239
SK Versafloppy I, A&T, List	CALL
Versafloppy II, DD Kit, List \$413	349
Versafloppy II, A&T, List	CALL
DELTA double density, A&T	345
CONDUCTOR, double density, A&T	269
INTERSYSTEMS FDC-2, A&T	CALL
MICROMATION Doubler, DD A&T	429
TARBELL Floppydisk, SD, Interface Kit	199
double density, A&T, List \$495	444

### ESCON CONVERSION FOR IBM SELECTRIC

Complete with microprocessor controller and power supply. Factory built. User installs solenoid assembly or it can be done at Esccon factory for \$100.

Parallel (TRS-80, Sorcerer, etc.) \$575	\$ 514
RS232 Serial, List \$599	534
TRS-80 Cable	25

### CALIFORNIA COMPUTER SYSTEMS

Z80 CPU BOARDS, List \$299	\$ 269
DISK CONTROLLER 2422, with CPM, List \$399	359
16K STATIC, A&T, List \$349.95	259
32K STATIC, List \$710	599
64K DYNAMIC BOARD, List \$699	499

## CPU BOARDS (assembled unless noted)

NORTH STAR Z80A (ZPB-A/A), List \$299	\$ 254
CROMEMCO 4MHz (ZPU-W), List \$395	335
4MHz (SCC-W), List \$495	382
INTERSYSTEMS (formerly Ithaca Audio) MPV-80, 4 MHz, List \$395	349
SSM CBI 8080, A&T, List \$252	214
CB2 Z-80, A&T, List \$344	289
CB2 Kit, List \$260	219
DELTA Z-80, with I/O	289
SD SBC-100 ASM, List \$413	349
SBC-100 KIT, List \$341	289
SBC-200 ASM, List \$471	399
SBC-200 Kit, List \$373	317

## MEMORY BOARDS 32K SD EXPANDO RAM KIT CALL FOR PRICES

NORTH STAR 16K Dynamic RAM Board A&T (RAM)-16-A/A, List \$499	\$ 399
32K A&T (RAM-32/A), List \$739	599
CROMEMCO 16KZ-W, List \$495	419
64 KZ-W, List \$1495	1269
MEMORY MERCHANT 16K Static-4 MHz	159
MEASUREMENT SYSTEMS & CONTROLS (Guaranteed performance, inclu. labor/parts 1 yr.)	
DM6400 64K Board w/all 64K, List \$795	599
DM4800 with 48K, List \$695	650
DM3200 with 32K, List \$595	509
DMB6400 64K Board w/all 64K	799
DMB4800 with 48K	789

## INTERSYSTEMS (formerly Ithaca Audio)

8K Static 2 MHz, A&T, List \$165	\$ 149
64K Dynamic, List \$995	849

## CALIFORNIA COMPUTER

16K Static, A&T, List \$349.95	\$ 269
--------------------------------	--------

## VIDEO BOARDS I/O Mapped

SD COMPUTER VDB-8024, Kit, List \$437	\$ 369
Assembled, List \$556	469
XITEX SCT-100K, Kit	ONLY 169.95
SCT-100A, Assembled, List \$215	189.95
SSM VB2 I/O, Kit, List \$199	169
Assembled & Tested, List \$269	229

## VIDEO BOARDS (continued)

### MEMORY MAPPED

SSM VB1C, 16x64, Kit, List \$179	\$ 152
Assembled & Tested, List \$242	206
SSM VB3, 80-Char, 4 MHz, Kit, List \$425	359*
4 MHz, A&T, List \$499	424

\*Subject to change

## NEW CROMEMCO 16FDC DOUBLE DENSITY DISK CONTROLLER

List \$595... OUR PRICE \$499

F.O.B. shipping point. All prices subject to change and all offers subject to withdrawal without notice. Advertised prices are for prepaid orders. Credit card and C.O.D. 2% higher. C.O.D. may require deposit.

— WRITE FOR FREE CATALOG —

» **Mini Micro Mart, Inc.** «

943 W. Genesee St. Syracuse, New York 13204 (315) 422-4467



# The IRS And You

## Tax Guide For Micro Users

As we approach the end of the year, it is time to begin thinking about calculating our individual income taxes. Software vendors are promoting microcomputer income tax programs that promise quick and easy relief from the burden of doing our taxes. They may save us some time, but rarely do they save us any money. However, computers can save us money when it comes to income taxes.

Home computer owners will have invested anywhere from \$300 to \$30,000 in their systems. Such expenditures can have significant tax implications if you are careful in planning your purchases and documenting their use. The IRS offers very generous tax credits and deductions if you qualify.

Deductions are allowed for profits or losses from a business or profession, capital gains and losses, employee business expenses, tax preparation expenses and investment fees and expenses. If you use your computer for any of the activities listed above, you can qualify for deductions of part or all of the expenses relating to the use of your computer.

### Profits or Losses From a Business or Profession

Schedule C is the form you fill out to document any profits or losses from a business or profession. If you provide any type of service, or engage in any type of sales activity which utilizes the computer, you can deduct those expenses from your income. A qualifying business does not have to be a full-time activity and may be operated from your place of residence (for example, consulting, producing software and selling computer equipment and supplies).

If you are operating the business on

a part-time basis, any losses you incur can be deducted from income derived from other sources such as salary. Also note that if the business becomes very successful, all profits must be added to your income.

The IRS imposes strict rules on deducting losses from hobby activities, so you must substantiate the business nature of your activities if you plan to deduct losses from a computer business. The following criteria apply:

*The manner in which the activity is operated.* Is it conducted in a business-like manner? Are there indications that a business actually exists (business license, cards, letterhead)?

*The expertise of the owner.* Is he/she qualified to conduct such a business?

*The time and effort expended.* Are business activities actually conducted and to what extent?

*The relationship of profits earned to expenses and losses.* Is revenue generated from the activity or is it operating at a total loss? If there are excessive losses, the business becomes questionable.

*The financial status of the individual.* Does he expect significant additional income from the activity?

*Elements of personal pleasure or recreation.* Is there a serious intent to conduct a business?

A general rule used by the IRS to determine whether or not the activity is a business is the profitability presumption. If the activity shows a profit in at least two out of five years, then the IRS bears the burden of proving that the activity is a hobby rather than a business or trade.

Ms. C is an elementary school teacher who decided to start a part-time business producing educational software for microcomputers. She purchased two computer systems at \$2000 each, a printer for \$1000, \$500 in disks and paper and \$500 in books and technical manuals. She also incurs expenses for obtaining a business license (\$50), letterhead sta-

tionery and business cards (\$100) and travel expenses (\$500). She received \$200 for providing tutoring in computers and \$500 from the sale of a program.

The activity is conducted as a business, and during the year she incurred expenses totaling \$2650 and received \$700 in income for a total net loss of \$1950, which may be deducted from her salary as a teacher. Note that the total cost of the computers and printer (\$5000) cannot be deducted during the first year but is depreciated.

For further information regarding the tax treatment of hobby/business activities, consult sections 162, 183 and 212 of the Internal Revenue Code.

### Employee Business Expenses

As an employee, you may deduct certain expenses related to the use of a computer in your job (form 2106). Materials, supplies, publications, journals, supplementary education and computer expenses can be deducted if you meet necessary requirements.

Mr. E, a programmer with Acme Software Services, is assigned to a project that involves the preparation of a financial forecasting model for an important client. The project will be due in five months. E discussed with his supervisor the possibility of having Acme lend him a computer so that he may do some of the work at home. Acme could not release their computer, but E's supervisor suggested that it would be a very good idea to do some of the work at home since it was an important job. E later purchased a microcomputer to assist him in writing the program. At the same time, he also enrolled in an economics and advanced computer programming class at a local university.

E may deduct a portion of the computer expense, computer supplies, tuition, books and materials for the classes as

(continued on page 238)

Hoy Quan is a consultant for COMTEC, 891 Ashtya, Montebello, CA 90640.



# Our incredible low prices just got 2% lower. Have a merry computer and a happy software.

Take an additional 2% off our listed prices, until December 24.

## 16 K RAM KITS

NEC 4116 200 ns ..... 17.95

## DISKETTES

MD 525-01,10,16 ..... 26.50  
MD 550-01,10,16 ..... 44.50  
MD 577-01,10,16 ..... 34.80  
MD 557-01,10,16 ..... 45.60  
FD 32 OR 34 -9000 ..... 36.00  
FD 32 OR 34 -8000 ..... 45.60  
FD 34-4001 ..... 48.60

## PRINTERS

ANADEx DP 9500 ..... 1295.00  
ANADEx DP 9501 ..... 1295.00  
CENTRONICS 739 ..... 765.00  
C-Itoh 25 CPS PARALLEL ..... 1440.00  
C-Itoh 25 CPS SERIAL ..... 1495.00  
C-Itoh 45 CPS PARALLEL ..... 1770.00  
C-Itoh 40 CPS SERIAL ..... 1870.00  
C-Itoh TRACTOR OPTION ..... 195.00  
EPSON MX-80 ..... \$CALL  
EPSON MX-80 F/T ..... \$CALL  
EPSON MX-100 GRAPHIC ..... \$CALL  
EPSON GRAPHICS ROM ..... 90.00  
IDS-445G PAPER TIGER ..... 779.00  
IDS-460G PAPER TIGER ..... 945.00  
IDS-560G PAPER TIGER ..... 1195.00  
NEC SPINWRITER 3510 SERIAL RO ..... 2195.00  
NEC SPINWRITER 3530 PARALLEL RO ..... 2195.00  
NEC SPINWRITER 7710 SERIAL RO ..... 2645.00  
NEC SPINWRITER 7730 PARALLEL RO ..... 2645.00  
NEC SPINWRITER 7700 D SELLUM OPTION ..... 2795.00  
NEC SPINWRITER 3500 SELLUM OPTION ..... 2295.00  
OKIDATA MICROLINE 80 ..... 399.00  
OKIDATA MICROLINE 82A ..... 569.00  
OKIDATA MICROLINE 83A ..... 899.00  
OKIDATA MICROLINE 84 ..... 1199.00

## APPLE SOFTWARE

MAGIC WINDOW WORDPROCESSOR ..... 89.00  
MAGIC WAND ..... 275.00  
WORDSTAR—APPLE ..... 259.00  
MAILMERGE—APPLE (REQUIRES WORDSTAR) ..... 90.00  
SPELLSTAR—APPLE (REQUIRES WORDSTAR) ..... 169.00  
DATASTAR ..... 199.00  
EXPEDITER II APPLESOFT COMPILER ..... 89.00  
PFS: PERSONAL FILING SYSTEM ..... 79.00  
PFS: REPORT GENERATOR ..... 79.00  
ASCII EXPRESS TERMINAL PROGRAM ..... 59.95  
Z—TERM COMMUNICATIONS SOFTWARE ..... 89.95  
MICROSOFT FORTRAN ..... 165.00  
MICROSOFT COBOL ..... 550.00  
DB MASTER 2.4 ..... 179.00  
VISICALC 3.3 ..... 169.00  
VISIPLLOT ..... 149.00  
VISIDEX ..... 169.00  
CCA DATA BASE MANAGER ..... 99.00  
A-STAT COMPREHENSIVE STATISTICS PKG ..... 119.00

## APPLE GAME SOFTWARE

SPACE EGGS ..... 24.95  
POOL 1.5 ..... 29.95  
RASTER BLASTER ..... 24.95  
GORGON ..... 32.95  
APPLE PANIC ..... 24.95

## CP/M SOFTWARE

MICROSOFT BASIC-80 ..... 299.00  
MICROSOFT BASIC COMPILER ..... 319.00  
MICROSOFT FORTRAN-80 ..... 399.00  
PEACHTREE SYSTEMS ..... CALL  
MAGIC WAND (REQUIRES CP/M\*) ..... 275.00  
WORDSTAR (REQUIRES CP/M\*) ..... 325.00  
MAILMERGE (REQUIRES WORDSTAR) ..... 110.00  
SPELLSTAR (REQUIRES WORDSTAR) ..... 199.00  
DATASTAR ..... 249.00  
SPELLGUARD ..... 239.00

## MODEMS

NOVATION CAT ACOUSTIC MODEM ..... 145.00  
NOVATION D-CAT DIRECT CONNECT MODEM ..... 155.00  
NOVATION AUTO-CAT AUTO ..... 219.00  
NOVATION APPLE-CAT ..... 349.00  
UDS 103 LP DIRECT CONNECT MODEM ..... 175.00  
UDS 103 JLP AUTO ANSWER ..... 209.00  
D.C. HAYES MICROMODEM II (Apple) ..... 299.00  
D.C. HAYES 100 MODEM (S-100) ..... 325.00  
D.C. HAYES STACK Smart Modem (RS 232) ..... 249.00  
LEXICON LX-11 MODEM ..... 115.00

We stock a complete line of computer covers, printer ribbons, print wheels & NEC thimbles—CALL US FOR YOUR NEEDS.

## APPLE HARDWARE

VERSA WRITER DIGITIZER ..... 209.00  
ABT APPLE KEYPAD ..... 119.00  
MICROSOFT Z-80 SOFTCARD ..... 299.00  
MICROSOFT RAMCARD ..... 170.00  
7710A/D SERIAL ..... 139.00  
VIDEX 80 X 24 VIDEO CARD ..... 299.00  
VIDEX KEYBOARD ENHANCER ..... 99.00  
M & R SUPERTERM 80 X 24 VIDEO BOARD ..... 315.00  
NEC 12" GREEN MONITOR ..... 235.00  
SANYO 12" MONITOR (B & W) ..... 249.00  
SANYO 12" MONITOR (Green) ..... 279.00  
SANYO 13" COLOR MONITOR ..... 469.00  
TEECO 12" HIGH RES GREEN MONITOR ..... 159.00  
SSM AIO BOARD (INTERFACE) A&T ..... 165.00  
SSM AIO BOARD (INTERFACE) KIT ..... 135.00  
CPS MULTIFUNCTION BOARD ..... 209.00  
MUSIC SYSTEM ..... 459.00

## MORROW DESIGNS

### FLOPPY DISK SYSTEMS

Controller, P.S., Cables, Microsoft Basic, CP/M\*, A & T  
DISCUS I (Single Drive—250 K) ..... 799.00  
DISCUS I (Dual Drive—500 K) ..... 1429.00  
DISCUS 2D (Single Drive—500 K) ..... 869.00  
DISCUS 2D (Dual Drive—1 MEG) ..... 1499.00  
DISCUS 2 + 2 (Single Drive—1 MEG) ..... 1099.00  
DISCUS 2 + 2 (Dual Drive—2 MEG) ..... 1999.00

### HARD DISK SYSTEMS

Controller, P.S., Microsoft Basic, CP/M, A&T  
DISCUS M10 (10 Megabytes) ..... 2949.00  
DISCUS M20 (20 Megabytes) ..... 3829.00  
DISCUS M26 (26 Megabytes) ..... 3949.00

✓ 311  
**Alpha  
Byte  
STORES**  
**(213) 706-0333**  
31245 La Baya Drive, Westlake Village, California 91362

**We built a reputation on our prices and your satisfaction.**

We guarantee everything we sell for 30 days. If anything is wrong, just return the item and we'll make it right. And, of course, we'll pay the shipping charges.

We accept Visa and Master Card on all orders. COD accepted up to \$300.00.

Please add \$2.00 for standard UPS shipping and handling on orders under 50 pounds, delivered in the continental U.S. Call us for shipping charges on items that weigh more than 50 pounds. Foreign, FPO and APO orders please add 15% for shipping. California residents add 6% sales tax.



# WE'D LIKE TO THANK THE FOLLOWING PEOPLE:



UNIVAC  
IBM  
WANG  
Digital Equipment Corp.  
Xerox  
Honeywell

Bless them all. For they were the pioneers.

They were the guys who started with a computer the size of a house, and managed to scrunch it down to the size of a typewriter.

And now, along comes Wordsworth™ and makes it as easy to use as a typewriter.

It's almost embarrassing.

Because all we've really done is distill a lot of great ideas, from a lot of great companies, into one great, low-cost, small space, letter-quality word processor.

With the world's simplest software programs that tell you, right on the screen, how to do all sorts of not-so-simple stuff.

With very little training (a simple "short course" owner's manual), and with very little exaggeration, you can make Wordsworth do anything that a heavy-duty IBM or Wang system can do. In a fraction of the space, at a fraction of the cost. (Within a half hour after you plug it in, you can be turning things out—from typing form letters, to generating accounting reports.)

One more thing. After you've read that brief manual, we back you with a service unique in the industry: "Call Wordsworth." Instant answers to any questions you ever have about how to use Wordsworth. Call toll-free, no fee, and we'll talk you through it, walk you through it, step by step.

So at last, after some of the world's biggest companies developed some of the world's most advanced technology...

Life can be simple.

**WORDSWORTH**

For the name of your nearest dealer, call toll-free 1-800-343-6833.

In Massachusetts, call collect (617) 828-8150.

Dealers: For more information about Wordsworth, and immediate delivery from the Leading Edge Inventory Bank™ on some of the industry's most popular computer products, just give us a call.

**LEADING  
EDGE™**

355

Leading Edge Products, Inc.  
225 Turnpike Street  
Canton, Massachusetts 02021  
Telex 951-624